RECIPE INSIDE: KOREAN COCONUT DUSKY GROUSE

Montana Outdoors

MONTANA FISH, WILDLIFE & PARKS | $4.50

OVEMBER-DECEMBER 2023

HOW'S YOUR WINTER?

For elk, it all depends on mountain meadow conditions last summer

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- MY WORST PHOTO EVER
- ZAMBONI-FREE ICE SKATING
- SEARCHING FOR GREAT GHOSTS
- ISLAND LIVING, CENTRAL MONTANA STYLE

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Montana Outdoors

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ON THE PROWL Showing its distinctive dished face, amber eyes, and mottled plumage, a great gray owl flies through a forest in northwestern Montana. See page 14 to learn how FWP is monitoring Montana's largest owl species. Photo by Donald M. Jones.

COVER Scientists are finding that mountain meadow health and size are key to elk winter survival. See page 38 to learn how FWP is using that information to better manage elk. Photo by Neal Herbert/NPS.

DEPARTMENTS

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Fewer, not more, trails

As an avid hunter and hiker, I appreciate the efforts of land managers and volunteers to clear and maintain our public land trails, as described in "Clearing the Way" in the September-October issue of *Montana Outdoors*. However, the article also noted that many miles of new trails are also being built in Montana, and that is deeply concerning.

Studies are revealing the increasing and significant effects that trails can have on wildlife and wildland integrity. And it's not just limited to impacts from motorized recreation. Even muscle-powered activities like mountain biking and foot traffic can displace wildlife, increase wildlife-human confrontations, and, in the case of people recreating with dogs, degrade water quality. You'd think that Montana conservation groups would be raising this concern, but many are actually advocating new trail construction.

A bumper sticker I recently saw declared, "Recreation is Not Conservation." I hope both government agencies and NGOs concerned about the future of our wildlife and wildland heritage wake up to this inconvenient truth.

Dennis Glick
Livingston

We deliver

Well, you folks delivered big time! When I wrote a letter expressing my interest in learning about the reasons for the decline in pronghorn numbers in the state, I really didn't expect a reply, let alone a whole magazine article addressing the situation ("Removing the Obstacles," September-October).

I am so relieved and grateful to learn that this matter is being monitored and appropriate responses are being taken. It may be that during my eight decades I have seen the "glory days" of antelope hunting in this state, but it's encouraging to know that younger hunters may still have a chance to experience what I have been so fortunate to have experienced, or something close to it. Pronghorn are one of the iconic western big game species, and they deserve our very best stewardship.

TRAILS MAINTENANCE

CLEARING THE WAY

Volunteers roll up their sleeves to repair, unclog, and construct trails across Montana.

BY PAUL QUENEAU

Chuck Tarinelli
Belgrade

Witness to pronghorn barriers

I have lived in eastern Montana for 63 years and have watched antelope struggle during our harsh winters. To survive, antelope will travel many miles in the winter. When Interstate 94 was built, they put woven wire fence along both sides of the freeway. Because the interstate runs east-west, it becomes a major antelope migration obstacle. Every time we have a bad winter, hundreds of antelope die along the area on the north side of the freeway. It appears that they will not cross by way of the several underpasses built between Glendive and Wibaux.

Last winter they were stacked up right by an underpass just east of Glendive and would not cross under the freeway. Perhaps there is a solution to at least make underpasses crossable for antelope. By the way, there are some much smaller culverts between Glendive and Fallon that antelope do use.

Craig Wagner
Glendive

Questions priorities

Thank you for *Montana Outdoors*. I enjoy and learn something from every issue.

I am writing out of concern with the Our Point of View column in the July-August 2023 issue ("2023 Legislative summary") in which your director says that SB 295 was "the biggest success" of the 2023 session. That bill directs FWP to adopt rules that make it easier for ranchers to kill grizzly bears when they are perceived to be in conflict situations.

I understand that this is a great win for ranchers, but is it really a win for wildlife and the 95 percent of nonranching Montanans for whom FWP manages wildlife as a public trust resource? The interaction between ranching interests and grizzly bears is real, making it impossible to manage one without managing the other, but I would hope that FWP would side with wildlife and the majority of Montanans on issues like this. Compromises are often needed, and perhaps this is one of those situations, but for FWP to celebrate this particular compromise as "the biggest success" of the legislative session is out of step with the agency's mission.

Josh Elliott
Missoula

Inherent value

I was able to sit down yesterday and read the September-October issue of *Montana Outdoors* cover to cover. Your essay titled "A workinglands ignoramus" (Sketchbook) is a great introduction to what I hope will be a lengthy and informative article or two about the state and its people. As someone who grew up farming and around livestock, even I find myself occasionally researching what type of crop I saw from the car window.

This piece goes hand in hand with your other article in the issue about ethics ("Do the Right Thing"). As a bowhunter education instructor, I strive to instill the ethics and fair chase ideals in my students. With so many people moving to our state, many not from rural backgrounds or outdoors traditions, the ethics or manners concerning the outdoors they show are not always what we might hope for. This is where your workinglands article will be helpful. If folks can understand a little about the land and the people, maybe they can find a closer connection to that land and see its inherent value.

Andy Knapp
Missoula

Corrections

In the September-October 2023 Outdoors Report, we incorrectly stated that FWP pays Montana counties a total of $445,000 each year. The correct figure, as of 2020, is $875,000. In our article on pollinators ("Pollinators Forever," July-August), the insects on page 41 labeled as bees are syrphid flies, also known as flower flies or hoverflies. ■

Korean Coconut Dusky Grouse with Broccoli

By Tom Dickson | **Preparation time: 10 minutes** | **Cooking time: 10 minutes** | **Yield: 4 servings**

I confess, there are no dusky grouse in North or South Korea. This recipe name refers to Montana's dusky (blue) grouse prepared with gochujang, a staple of Korean cooking.

The Korean Peninsula is home to one native grouse, the hazel grouse, also found across northern Eurasia as far west as Sweden. The quail-size bird, which lives in conifer forests, is among the world's smallest grouse. I could find no information on its table qualities.

Above: Hazel grouse
Below: Dusky grouse

But I do know that our dusky grouse is considered by many hunters to be Montana's tastiest game bird. The flesh is pale with a hint of sweetness that may come from the berries the grouse eat during September when most are harvested.

Dusky grouse are best cooked unadorned, either plucked and roasted (rubbed with olive oil or soft butter beforehand) or sautéed in olive oil. A seasoning of salt and pepper afterward is all that's needed.

But if you have several duskies—or pheasants, ruffed grouse, or chicken breasts or thighs—and want to try something quick, easy, and delicious, this variation of a *New York Times* recipe is wonderful. *NYT* readers gave it nearly 3,000 five-star reviews, and it passes my "fast and fabulous" test for inclusion in *Montana Outdoors*.

Gochujang, found in the Asian food section of most large supermarkets, is a fermented red chile paste made from spicy Korean chile peppers and glutinous rice. This recipe combines it with coconut milk, which mellows the spiciness, and fresh ginger for brightness.

I have to imagine that somewhere in North Korea or South Korea, someone has made something like this with a hazel grouse or two.

The recipe calls for broccoli as the vegetable accompaniment, but cauliflower or brussels sprouts work fine instead. ■

—Tom Dickson is the Montana Outdoors editor.

FROM TOP: DAVID MALOSH; SHUTTERSTOCK; SHUTTERSTOCK

INGREDIENTS

2 T. canola oil

1½ lbs. boneless, skinless dusky or ruffed grouse, pheasant, or chicken breasts or thighs, cut into 1½-inch pieces

Kosher salt and black pepper

1 (2-inch) piece fresh ginger, peeled and minced (about ⅓ cup)

½ c. unsweetened coconut milk

2 T. light brown sugar

2 T. gochujang paste

2 T. low-sodium soy sauce

1 lb. broccoli florets, cut into 2-inch pieces

Cooked rice, for serving

Sliced scallions or chopped fresh cilantro, for garnish (optional)

DIRECTIONS

In a large nonstick skillet, heat oil over medium-high setting. Season meat with salt and pepper and cook, stirring occasionally, until golden all over, about 3 minutes. Add ginger and cook, stirring occasionally, until softened, about 2 minutes.

Stir in coconut milk, sugar, gochujang, and soy sauce and bring to a simmer, stirring until gochujang dissolves. Gently simmer over medium-low heat, stirring, until meat is cooked through, about 5 minutes.

Meanwhile, in a saucepan of salted boiling water, blanch broccoli until crisp-tender, about 2 minutes. Drain.

Divide meat and broccoli among plates; spoon with sauce. Serve with rice. ■

◀ More recipes from *Montana Outdoors*

Supporting Montana public stream access

As you read this, duck and goose hunters are hunkered down in fields or crouched in blinds along lakes, reservoirs, ponds, rivers, and streams across Montana. We're in the heart of the 2023-24 waterfowl hunting season.

State law provides waterfowlers public access to hunt along streams and rivers—as well as allowing others to fish, kayak, and engage in water-based recreation on those waters.

Montana Fish, Wildlife & Parks fully supports the Stream Access Law and the recreation it provides. Users must stay within the bounds of the law by accessing streams and rivers at legal entry points and staying below the ordinary high-water mark.

Few states in the nation have a law like this, which is part of the cherished Montana way of life. In most, like Wyoming and Idaho, it's illegal to walk along any stream or river without a landowner's express permission. In Colorado, it's even illegal to anchor your boat in a river.

In Montana, stream access is settled law.

In 1984, the Montana Supreme Court held that surface waters capable of recreational use may be used by the public for water-based recreation. In a 2014 ruling on landowner efforts to close off portions of the Ruby River, the state's highest court upheld the Stream Access Law, adding that landowners can't close routes to public land or water where recreationists have a history of use. The following year, the Montana Legislature made clear that streams and rivers could be legally accessed at bridge crossings.

In recent years duck hunters, anglers, and floaters have been challenged by some landowners or their agents while legally accessing streams and rivers. Some landowners may not be familiar with our state's access laws and the important tradition of public access to the state's outdoor recreation culture.

FWP wants everyone who lives in and visits this state to know the law. To be clear:

▸ The public has the legal right to access rivers and streams by crossing state or federal land, including FWP fishing access sites and wildlife management areas, and via public road right-of-ways and easements, including bridges, as well as across private land with the landowner's permission. Landowners may fence bridges to keep livestock off roads, but they can't construct fences or other barriers aimed at keeping the public out.

▸ As long as people legally enter a stream or river, they are not trespassing, even if signs posted at bridges and elsewhere say otherwise.

▸ As long as they stay below the ordinary high-water mark*, the public can walk in and along a stream or river while partaking in water-based recreation on those waters.

What the public legally can't do is:

▸ Access public waters in any manner not listed above.

▸ Go above the high-water mark to get around a natural obstruction like a steep bank, fallen tree, deep pool, or waterfall. The only exception is when a fence, instream diversion, or other human-caused obstruction prevents safe passage up or down the channel. In that case a person can go around the obstruction.

▸ Hunt big game without landowner permission unless the stream or river is part of public land.

▸ Litter or otherwise degrade private land.

Duck hunting a legally accessed stream in south-central Montana

CRAIG W. HERGERT

Montana isn't like most states. We've enshrined outdoor recreation as one of our highest values. That appreciation has protected our wild trout, wilderness, wildlife populations, scenic open space, and abundant public access to public lands. It's part of our way of life.

Here at FWP, we want to be sure that landowners and others know what the Stream Access Law says and how important public access is to Montanans.

—**Dustin Temple**, *Director, Montana Fish, Wildlife & Parks*

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* The line that water impresses on the shoreline by covering it for sufficient periods to cause physical characteristics that distinguish the area below the line from the area above it. Generally observable as a clear, natural line impressed on the bank or indicated by terracing, changes in soil characteristics, destruction of vegetation, presence or absence of debris on banks or streamside branches, or other similar characteristics. Floodplains adjacent to surface waters are not considered to lie within the high-water marks.

THOM BRIDGE

CHAOS COORDINATOR

JEANNE CONNOLLY
Montana WILD Event Coordinator, Helena

I GREW UP IN HELENA and, after 18 years of bartending, started working for the state in 1993 with the Montana Department of Livestock's Animal Health Division. I was the person you called if you wanted to bring livestock into Montana from another state or Canada. I took a few years off to raise my son, and then I started working for FWP, first in the Licensing Bureau and then at the headquarters front desk. There I learned to answer—or find the right person who could answer—every hunting, fishing, and state parks question you could imagine.

For the past three years I've had the good luck to work the front desk here at the Montana WILD Education Center. My main job is to schedule student groups visiting the center and different organizations wanting to use our meeting rooms. I make sure we have staff here at various times to lead the different educational activities, and I set up whatever projectors, computers, and other technology the conservation groups and other organizations need for their evening meetings.

We have a great crew here, where everyone pitches in to help each other out. My coworkers call me the "chaos coordinator," and I'm proud to say that I definitely coordinate a lot of chaos. In addition to wrangling school groups, I welcome tourists and other visitors to Montana WILD, clean the facility, tend to our pollinator garden, create crafts and educational activities for students, and assist in teaching fishing and archery. Lately I've been learning taxidermy to help build new exhibits. I also took workshops to learn about video composition and lighting so I could help film our education staff for their nationally recognized FWP social media posts.

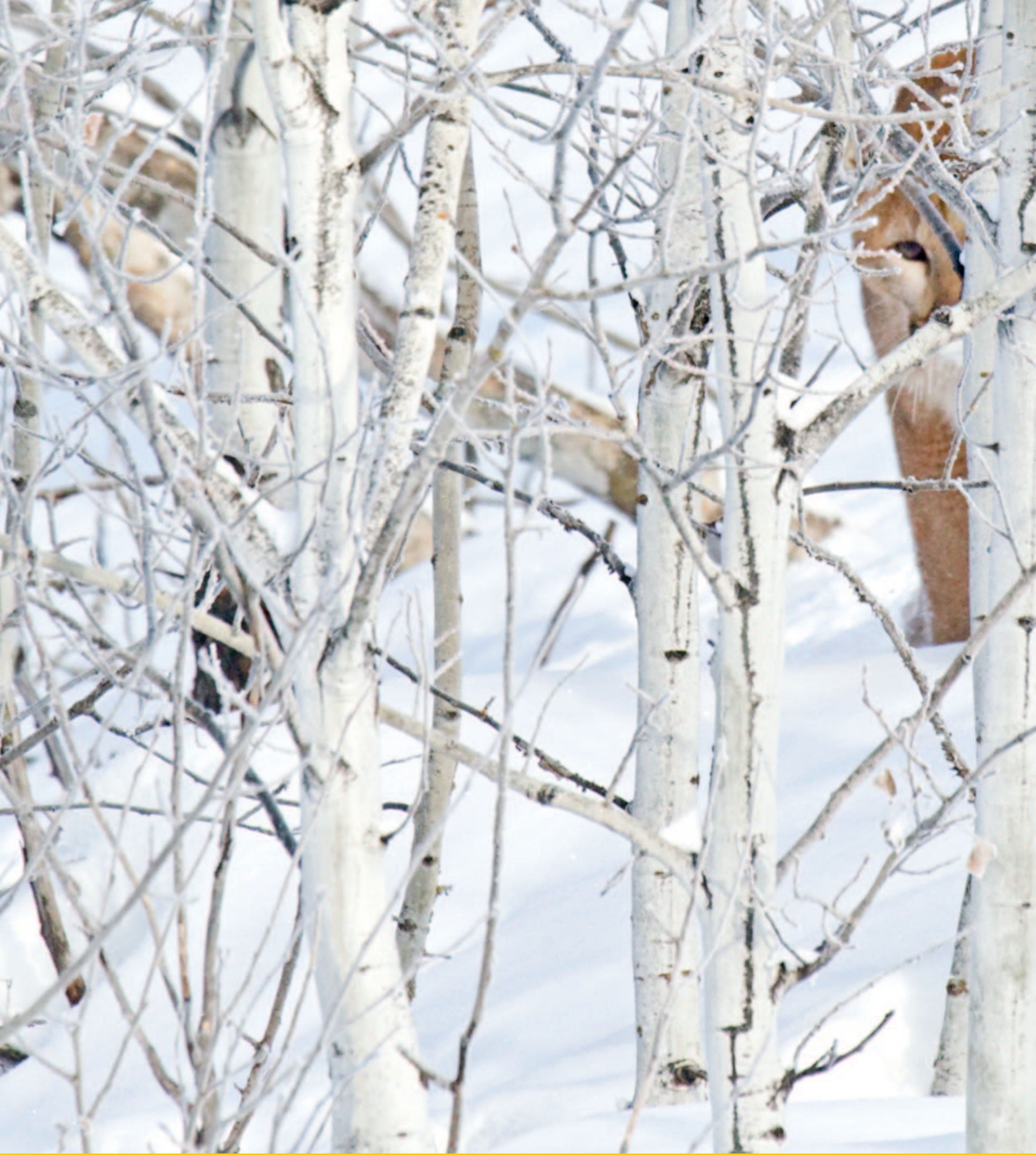
I love that, at age 62, I'm continuing to learn new things. I guess I'm just a young person at heart. I bought myself a Harley Davidson Dyna Low Rider when I turned 50. Riding my motorcycle and spending time with my two dogs—a teacup chihuahua and a bullmastiff-pit bull mix—are how I unwind at the end of a long day of helping kids learn about Montana's natural world.

SNAPSHOT

After a 20-year career flying jet fighters for the U.S. Air Force, **Neal Mishler** moved to Great Falls and took up wildlife photography. A longtime hunter, Mishler says he “put my guns away for good and bought myself a camera. With photography, you get to observe the wildlife up close, and then can walk away and do it again the next day with the same group of animals. That’s not really possible with hunting.”

Mishler took this photo of a white-tailed jackrabbit on a cold January morning at Benton Lake National Wildlife Refuge. “The jackrabbits, cottontails, and sharp-tailed grouse all hang out in the shelterbelts and come out in the morning to feed and get some sun,” he says. ■

Alexander Badyaev, a professor of evolutionary biology at the University of Arizona who conducts wildlife research in Montana, spent almost a decade studying beavers in the Blackfoot Valley to learn how they intentionally topple trees toward water. During the hundreds of hours he spent at night watching and photographing the large rodents gnawing on Douglas firs and ponderosa pines, Badyaev became acquainted with a male mountain lion, one of several species that prey on beavers. "I would see him hiding behind the stumps or lying down in grass awaiting the beavers' arrival," says Badyaev, a multiple first-place winner of photography competitions sponsored



by BBC International, the London-based Natural History Museum, the National Wildlife Federation, and the Royal Society. “Later, during the winter mating season, I saw him again, this time in a nearby aspen grove where he was clawing and marking trees.”

Badyaev says he framed this particular photo to pay homage to two artistic inspirations—Minnesota photographer Jim Brandenburg’s famous “Brother Wolf” photo and Bev Doolittle’s trompe l’oeil paintings of horses and horsemen hidden in aspen groves. “I like how you are looking at this photograph from left to right and then, right at the end, you go, ‘Whoa!’” ■

Minimum thickness, in inches, of ice on which it's safe to drive an SUV or pickup. **12**

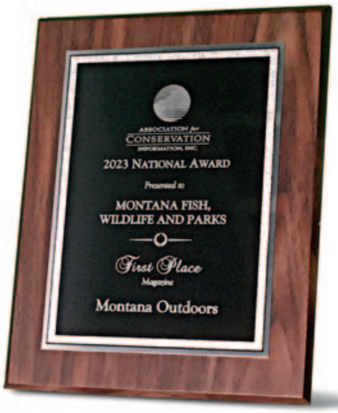
Montana Outdoors repeats with top magazine award

Montana Outdoors, the magazine of Montana Fish, Wildlife & Parks, won first place in the overall magazine category at the national Association for Conservation Information 2022 award competition held on July 28 in Lake Tahoe, Nevada.

This is the second consecutive first-place overall magazine win for the publication and its eighth in the past 20 years.

Montana Outdoors also won second place in the Destination, Historical or Cultural Article category with "A Place of Prominence," a profile of First Peoples Buffalo Jump State Park; third in the General Interest Article category with "The Lower Yellowstone's Untapped Potential," on plans to boost recreation on the river; and third in the Wildlife Article category for "Leave It to Beavers," on how the industrious rodents help conserve water for fish, wildlife, and agriculture.

Formed in 1938, the ACI is a national nonprofit organization of communicators working for state, federal, and private conservation agencies and organizations. ■



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2023 NATIONAL AWARD
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MONTANA FISH,
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First Place
Magazine
Montana Outdoors

Roster leading a shotgunning clinic in Helena

HUNTING

Who the heck is Tom Roster?

Duck and goose hunters: Ever wonder about that "Tom Roster's Nontoxic Shot Lethality Table" in the back of the waterfowl hunting regulations?

A world-renowned authority on steel, bismuth, and other nontoxic shot, Roster was a longtime consultant to the Cooperative North American Shotgunning Education Program (CONSEP). The nonprofit group was formed in 1982 and funded by several state conservation agencies, including FWP, to improve hunter proficiency with steel and other nontoxic shot.

The agencies were concerned about excessive waterfowl wounding by hunters unaccustomed to using federally required nontoxic shot. CONSEP was created in part to help waterfowlers learn to shoot steel shot more effectively.

According to Roster, the main difference between steel and lead shot is that some lead pellets deform in the air and thus move more slowly. This creates a longer shot string that makes for a more "forgiving" shot load—as long as the shot is placed well in front of the flying bird. Though shorter—due to fewer deformed pellets—the steel-shot string is also something hunters can use to their advantage. "The worst thing you can do is shoot behind the target, because you're not taking advantage of the shot string," Roster says.

In addition, because a lead BB is denser than a similar-size steel one, it punches deeper into the bird. To get the same lethality, a shooter needs a bigger and thus heavier shot size in steel than with lead. (Nontoxic HEVI-Shot is similar to lead in density.)

That's where Roster's table comes in. It shows the size of steel shot that's most effective on various sizes of waterfowl at various distances.

In a recent issue of *Outdoor Life*, Roster talks about steel shot lethality and the results of his 40 years of testing. His three main points:

- Because steel is less forgiving than lead, it requires more accurate shooting skill.
- The most-lethal steel loads for large ducks like mallards are No. 2, with No. 3 a close second. (Note that, surprisingly, No. 2 is also the most effective steel load for pheasants.) The most lethal steel load for Canada geese is BBB.
- Increased load velocity does not make a load more lethal or effective. ■

Read the article at outdoorlife.com ▶

Read more on shooting effectively with steel in "Too Many Misses," Montana Outdoors *September-October 2013.* ▶

CLOCKWISE FROM TOP LEFT: MIKE MORAN ILLUSTRATION; KANKANEE VALLEY POST

FWP Anaconda District game warden Sara Busso

MONTANA FWP

ENFORCEMENT

Women wardens workshop

FWP held its first workshop for potential female game wardens on September 16 at the Montana WILD Education Center in Helena. The five-hour event attracted 28 women interested in learning about a career enforcing Montana's game and outdoor recreation laws.

The workshop was part of the FWP Law Enforcement Division's effort to attract more candidates during the 2023 recruitment period, which begins December 4.

The workshop covered:

- A warden's typical day
- The process for becoming an FWP game warden
- Stories from current female wardens
- Mock investigations
- Ride-alongs with wardens.

"We were extremely pleased with the turnout," says Sergeant Brooke Shelley. "Hopefully, some of the women who came will consider joining us in wearing the Montana game warden badge."

Learn more about being a warden by watching the video featured on page 12 of this issue, and by visiting fwp.mt.gov/aboutfwp/enforcement/warden-hiring. ■

BOOK REVIEWS

Recommended reading

Our favorite books of 2023

Traditional Bows and Wild Places

By E. Donnall Thomas, Jr.

Don Thomas, of Lewistown, is a longtime *Montana Outdoors* contributor, the author of 20 hunting and fishing books, and a retired rural physician (in Montana and in Alaska, where he was also a bush pilot, commercial fisherman, and bear hunting guide). His latest book is a fascinating account of using traditional longbows to hunt everything from javelina and wild turkeys to mountain goats and African Cape buffalo.

Mouthful of Feathers: Upland in America

Edited by Thomas Reed, Greg McReynolds, and Reid Bryant

This collection of essays, stories, and poems belongs on the reading table of anyone who loves hunting upland birds. The essays pay special homage to the setters, pointers, Labs, and other breeds that read the forests, grasslands, and high desert with olfactory senses unimaginable to the hunters trailing behind. As T. Edward Nickens writes in his essay, "Making Sense," "Much of my love for bird hunting springs from this feeling that I am witness to, and a participant in, a richly layered choreography between various ways of experiencing the world."

Montana Panoramic

Craig W. Hergert. Essays by Shann Ray.

Few images capture the grandeur of Montana—big sky, big land, big mountains, big everything—as well as Bozeman photographer Craig Hergert's panoramic photographs. In his newest coffee-table book, Hergert takes viewers on a journey to 26 areas from Glacier National Park to Ekalaka. We almost don't want to recommend this stunning photography collection, because anyone who sees it will want to immediately move to Montana.

Western Water A to Z: The History, Nature, and Culture of a Vanishing Resource

By Robert R. Crifasi

This is one of two books on water we couldn't put down—and they could not be more different. *Western Water A to Z* is a comprehensive guide by a Colorado-based environmental scientist that clearly explains topics like hydrographs, floodplains, instream flows, watersheds, and irrigation. Though organized like an encyclopedia, the lively, engaging writing includes sections on Indigenous and European-American history and famous personalities like John Wesley Powell. Richly illustrated with maps and stunning photography.

Water Worlds

Edited by Rachel Taylor

If Crifasi's guide tells you everything you need to know about water conservation and management, this gorgeous coffee-table book largely lets photography speak to the beauty and wonder of water. Focusing on 12 locations across the planet, *Water Worlds* takes readers on a journey through every major type of water system, explaining how they work and what must be done to, in the words of editor Rachel Taylor, "sustain the abundance of life that comprises our incredible world." ■

FWP SOCIAL MEDIA SHOWCASE

Recent postings produced by FWP staff for Facebook and YouTube

Fish guts, blood barrels, and black bears

FWP videographer Lauren Karnopp joins wildlife biologist Colby Anton as he stinks up the forest to attract black bears to monitoring sites.

Telling grouse apart

FWP educator Ryan Schmaltz explains easy ways to identify two species of grouse: the ruffed (a forest species) and the sharp-tailed (a grassland species).

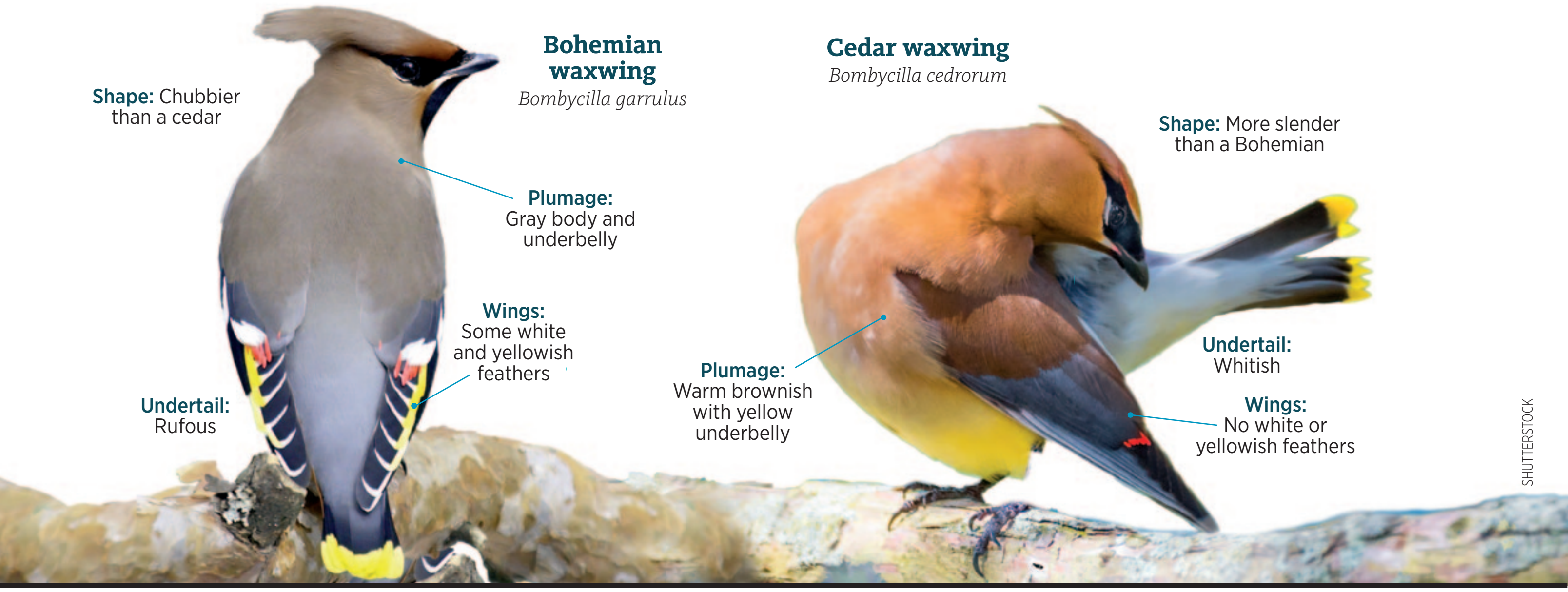
Being a game warden

FWP game wardens talk about why they love their jobs and the rewards that come with enforcing Montana's game, fish, and outdoor recreation laws.

LOOKALIKES

Tips for differentiating similar-looking species

Cedar and Bohemian waxwings are social birds that move about in large flocks, called "earfuls" or "museums," feeding on the berries of Rocky Mountain ash and other fruiting trees. Males and females of both species have a distinctive head crest and black mask, as well as red waxy tips on their secondary feathers. In summer, only cedars live here, but in winter, Bohemians come down from Canada to hang out in "warmer" Montana. ■


Bohemian waxwing
Bombycilla garrulus
Shape: Chubbier than a cedar
Plumage: Gray body and underbelly
Wings: Some white and yellowish feathers
Undertail: Rufous
Cedar waxwing
Bombycilla cedrorum
Shape: More slender than a Bohemian
Plumage: Warm brownish with yellow underbelly
Undertail: Whitish
Wings: No white or yellowish feathers

SHUTTERSTOCK

Feral hogs

What they are
Feral hogs are descendants of European wild boars brought to North America and released into the wild, or domestic hogs that have escaped and turned feral. Both are a big problem.

How to ID them
Feral hogs range in size from 75 to more than 300 pounds. The snout is long and flat at the end. The hair is coarse with long bristles, generally black but can be gray, brown, or red. Hunters, hikers, landowners, and others should be on the lookout for rooting or digging in woods, crop fields, and near streams and springs.

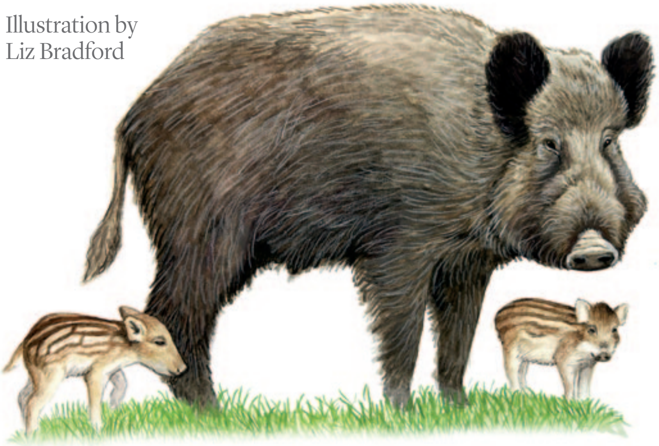


Illustration by
Liz Bradford

Where they're found
These destructive swine, which live in family groups called "sounders," have spread to 38 states and several Canadian provinces. Currently, the closest feral hogs to Montana are just a few miles from the state's border with Alberta north of the Sweet Grass Hills.

How they spread
Feral hogs, also known as wild pigs and wild swine, expand their range on their own. Additionally, they often escape after people illegally import them for game farms.

Why we hate them
In addition to eating and damaging crops, feral swine spread disease such as pseudo-rabies to livestock and wildlife, and destroy native plants by rooting in soil, digging up dirt like snorting rototillers. They also prey on nesting birds, small mammals, and deer fawns.

How to control them
Montana encourages people to report any wild pig sightings so that officials can quickly dispatch the animals. Sport hunting is not a control option. When hunted, sounders spread even more quickly, and other states have found that hunting creates advocacy groups that lobby for increased feral hog numbers. Report sightings to the state Squeal on Pigs hotline at 406-444-2976. ■

THE MICRO MANAGER

A quick look at concepts and terms commonly used in fisheries, wildlife, or state parks management.

"Heritage resources"

One of state land managers' major responsibilities is preserving and interpreting archaeological and historical sites and objects, known as "heritage resources."

Montana Fish, Wildlife & Parks manages more than 350 archaeological and historical sites at state parks, wildlife management areas, and fishing access sites. Roughly 60 percent are "pre-contact" archaeological sites (established before European exploration and settlement), such as the cliff at Madison Buffalo Jump State Park. The other 40 percent are "historic" sites (post-European contact), such as the ghost town at Elkhorn State Park. Many sites, like Travelers' Rest and Medicine Rocks, have both.

Seven Montana state park sites are designated National Historic Landmarks: First Peoples Buffalo Jump, Travelers' Rest, Bannack, Missouri Headwaters, Pictograph Cave, Chief Plenty Coups, and Rosebud Battlefield.

In addition to historic buildings and other structures, FWP-managed heritage resources include landscape features noted by the Lewis and Clark Expedition, a historic trading post, historic campsites, and a battlefield. Pre-contact sites include campsites, cave sites, pictograph and petroglyph sites, and buffalo jumps.

FWP's Heritage Resources Program provides stewardship of these culturally significant places by conducting research, documenting sites and artifacts, collaborating with tribes, building local "Friends of" partnerships, preserving buildings, and protecting, monitoring, and interpreting the sites. ■

Hikers at Madison Buffalo Jump State Park

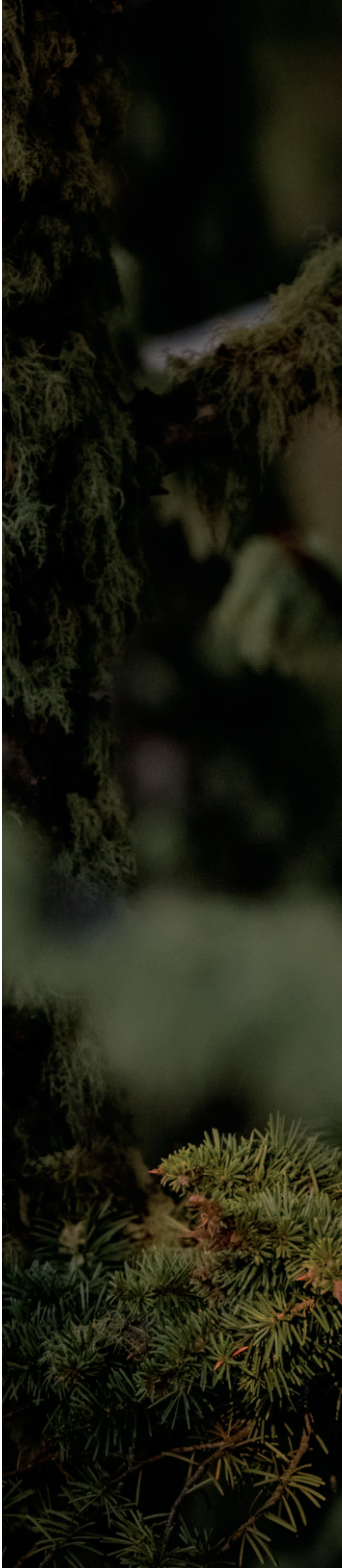
ANDY AUSTIN/MONTANA STATE PARKS

SEARCHING FOR GRAY GHOSTS

Why FWP biologists spent five years looking for great gray owls

STORY AND PHOTOS BY RONAN DONOVAN

AWAITING A REPLY Deep in a forest south of Bozeman this past winter, FWP regional wildlife biologist Claire Gower plays a recording of a boreal owl in the hopes that a great gray owl will respond and reveal its location.



It's a crisp, clear late-winter night with a full moon rising over the distant snow-capped mountains, which seem to glow from within.

Claire Gower straps on her cross-country ski boots and arranges gear on a pickup tailgate by the light of her headlamp. It's late—7:45 p.m.—with temperatures down to the teens, and Gower is still working. A regional wildlife biologist for Montana Fish, Wildlife & Parks, she is responsible for managing, conserving, and studying species ranging from bats to small forest carnivores to birds. Despite the cold and dark, she's cheery as we head out to see if she can locate one particular forest-bird species: the great gray owl.

Gower and several other FWP wildlife biologists contributed to a recently completed five-year survey across western and southwestern Montana to better understand the distribution of this largest North American owl and the ideal habitat for rearing its young. Like spadefoot toads, wolverines, and black swifts, great grays are rarely seen. Little is known about their numbers or locations, making them a Montana Species of Greatest Inventory Need. That means FWP puts them at the top of the list for surveys to determine where the forest owls live across the state. Using that baseline information, biologists can then figure out if wildfire, beetle kill, and logging alter great gray habitat and populations.

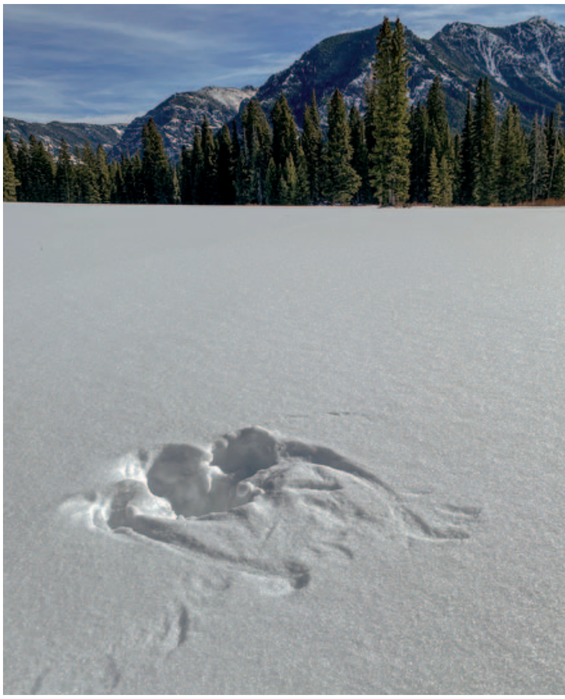
HOME OF THE HUNTERS

Great gray owls are a species of mature northern forests. Their habitat of large old trees, often next to open meadows, has been declining for decades due to logging and warming temperatures. The owls nest on broken-top snags or in abandoned stick nests built by northern goshawks or ravens. With a broad wingspan of over 4 feet, they silently glide over meadows like ghosts, hunting for small mammals such as voles and pocket gophers.

In winter, the owls hunt by sound alone. Using their giant dished face and offset ears to home in on the faintest squeaks and

LONG DAY FWP regional wildlife biologist Claire Gower prepares to cross-country ski deep into the Custer-Gallatin National Forest south of Bozeman in search of great gray owls.

BIG BUT ELUSIVE Though occasionally seen on winter days throughout western Montana, the large owls are difficult to survey to determine population and distribution. By identifying the types of habitats great grays used when previously spotted, wildlife scientists are now able to predict where the raptors are most ikely to be found.



HOME IN THE NORTHERN FOREST Above left: Montana's largest owl species, great grays often nest in the top of broken snags or in old goshawk or raven nests. Above right: The prints of a great gray show where it plunged feet-first into the snow to grab a small rodent it heard while flying overhead.

rustlings, they'll plunge down into deep snow to catch a tunneling rodent with their long legs and razor-sharp talons.

Montana is one of the few states where great gray owls make a living south of the 49th parallel. But timber harvest, forest fires, beetle-killed trees, and climate change threaten the species' breeding success and populations. For instance, it's becoming increasingly difficult for the raptors to hunt successfully in winter as variable temperatures cause more thawing and freezing, building thick snow crusts the birds can't punch through.

Gower shoulders her backpack and we ski into the Custer-Gallatin National Forest, 15 miles south of Bozeman. Moonlight casts long, bluish shadows in the dim conifer forest as we trudge along. She is heading to a site randomly selected through a survey model developed by Dr. Hannah Specht, a research scientist at the University of Montana.

To figure out the species' distribution across the state, where the owls breed, and the habitat they use, biologists needed a survey method most likely to locate the birds. Specht used known nest locations of owls from the Montana Natural Heritage Program, the U.S. Forest Service, FWP, the Owl Research Institute, and eBird to assess habitat suitability. By analyzing the habitat features, she devised a model of the best nesting habitat. Survey locations target these "best areas" to ensure that biologists conduct their surveys where owls are most likely to live.

NIGHT SURVEYS

Specht combined variables from known nest sites (including slope, land cover, vegetation height, and vegetation cover) to create a map. It shows the best potential great gray owl habitats across the species' range in Montana, and identifies survey locations that would encompass the core territory of a breeding owl pair—roughly 1.5 to 3.5 square miles.

Gower and her colleagues listened for great gray owls in these locations to determine the bird's distribution across Montana—and to learn how easy or difficult it is to find an owl in a likely area. I'm out with her tonight to learn how the biologists conduct their surveys. I've photographed the majestic raptors for years but haven't a clue how they would be scientifically tallied.

After a 30-minute ski, Gower stops on the edge of a meadow surrounded by forest, the distant peaks of the Gallatin Range

INTO THE NIGHT Another eight-minute survey completed, Gower skis to another location identified by Dr. Hannah Specht of the University of Montana as a likely place to hear a great gray owl.

Ronan Donovan is a conservation photographer, filmmaker, wildlife biologist, and National Geographic Explorer and Storytelling Fellow. He lives in Bozeman.

WE ARE HERE Gower records the GPS location of a survey in the Custer-Gallatin National Forest.

jutting up toward the stars. The night is still, with no wind—perfect for listening. She pulls a large speaker from her backpack and begins to play a series of recorded owl vocalizations designed to draw out a response from great grays.

Each survey lasts exactly eight minutes and follows a standardized protocol. It starts with Gower listening silently for three minutes. Then, for 20 seconds, she plays the call of a boreal owl (a species whose territory can overlap with great grays, eliciting what's known as a territorial response). Then one minute of silent listening, 20 seconds of broadcasting great gray vocalizations, another minute of listening, 20 seconds of great gray vocalizations, and finally two more minutes of listening.

Within a minute of playing the first series of boreal owl calls, Gower and I hear a loud, sharp *kip*! from the edge of the meadow. It's an owl, though not a great gray. A boreal owl coming to investigate a suspected intruder has made an alarm call.

Gower finishes the eight-minute survey before we head to the next site indicated on her map. As we lay fresh tracks through the deep snow, we hear the boreal owl switch to its more familiar call, a series of accelerated *toots* that sound like sharp, fast notes on a flute.

BETTER ADVICE

Surveyors use this nighttime in-person "call-back" method during the mid-February to late April breeding season. They repeat each survey twice during that period to increase the odds they'll locate an owl.

A second method uses small "autonomous recording units" (ARUs), affixed to trees within each survey grid. These remain in the forest, during the breeding season, for a week to record vocalizing great gray owls up to 300 meters away. Biologists then ski or snowmobile in to retrieve the recordings and, back at the office, run them through software that can identify different bird species by their calls.

After Gower and I arrive at the next survey location, she pulls out her speaker and repeats the call-back process. When the eight minutes are up, we talk about what FWP will do with the survey results.

"If we can better understand the habitat characteristics that a great gray owl is looking for, FWP and agencies like the U.S. Forest Service can use that information when they develop forest management plans," Gower says. She adds that the Forest Service and other conservation partners have requested Specht's habitat model and the details of FWP's monitoring methods so their own crews can do surveys.

"What we're doing tonight will help all of us more accurately predict whether owls are in certain areas and provide better direction for protecting owls and their nesting habitat," she says.

GOOD NEWS Using results from the new survey, FWP can now provide better direction to land management agencies like the U.S. Forest Service on how they can locate owls and best protect the birds' nesting habitat.

SKATING on WILD ICE

The joy of gliding along frozen lakes, reservoirs, ponds, and sloughs.

BY LINNEA SCHROEER

SOARING HIGH A figure skater performs an athletic jump off ideal wild ice on Whitefish Lake.

PHOTO BY NOAH COUSER

In early December 2020, like so many other people around the world, I was feeling lonely and sad. The COVID pandemic was in full swing, and for the first time in years my far-flung family had not gathered for Thanksgiving at my house in Bozeman. I missed them terribly, especially my elderly parents. I put up Christmas decorations to brighten my mood, but it wasn't working. Mike, my partner, was moping, too. We needed something new and different to lift our spirits.

Then one day while scrolling through Facebook, I saw posts of people ice skating at Quake Lake, formed in 1959 after a landslide impounded part of the upper Madison River. Photos and videos showed otherworldly images of people gliding past the lake's 60-year-old dead trees sticking up through ice as clear and flat as glass. Now *that* would be something different!

The next weekend I dug out my old figure skates and Mike grabbed his hockey skates, and we headed south along the Madison Valley. At the lake, we were surprised and delighted by the festive scene. Several dozen people had gathered to enjoy ideal skating conditions of smooth, thick ice, and be out in the open winter air. Groups of people were skating, playing hockey, and sitting in chairs on the ice sharing hot drinks and snacks. Strangers greeted each other warmly and invited others to share in their circle. I was entranced.

The night before had brought a skiff of snow, so the lovely clear ice was covered but still glass-smooth underneath. We carved figure-eights around the ghost trees and admired the designs our skates made in the thin snow. Mike had an extra hockey stick, and we had fun passing a puck back and forth. After a while, we headed out beyond the trees onto the open ice and reveled in the feelings of freedom and escape. We explored pressure ridges and exchanged awed expressions over the varying sounds the ice made—deep booms, cracking, groaning, pinging, and, at times, even whispering.

LONGTIME WINTER PASTIME Wild-ice skating has a long tradition in northern Europe and, with the arrival of immigrants, the United States.
"CENTRAL PARK, WINTER—THE SKATING POND," BY CHARLES PARSONS, 1862.

Growing up in the Midwest, I had been on frozen ponds before, but this was by far the deepest body of water I'd ever skated across. My heart beat faster and faster the farther we got from shore. Mike is an experienced ice skater and an expert judge of ice conditions—he used to run sled dogs on frozen rivers in Alaska—so the logical part of my brain knew I was safe. But the reptile part kept reminding me there was only about 6 inches of ice between me and 100 feet of very cold water. To be extra safe, I skated exactly in Mike's tracks, figuring that if the ice held him, it would definitely hold me.

> **We exchanged awed expressions with each other over the varying sounds the ice made—deep booms, cracking, groaning, pinging, and at times whispering.**

Toward the end of the day, we saw a man gliding by using long, easy strides on skates with long, straight blades and a free heel. His skates looked different from anything we had

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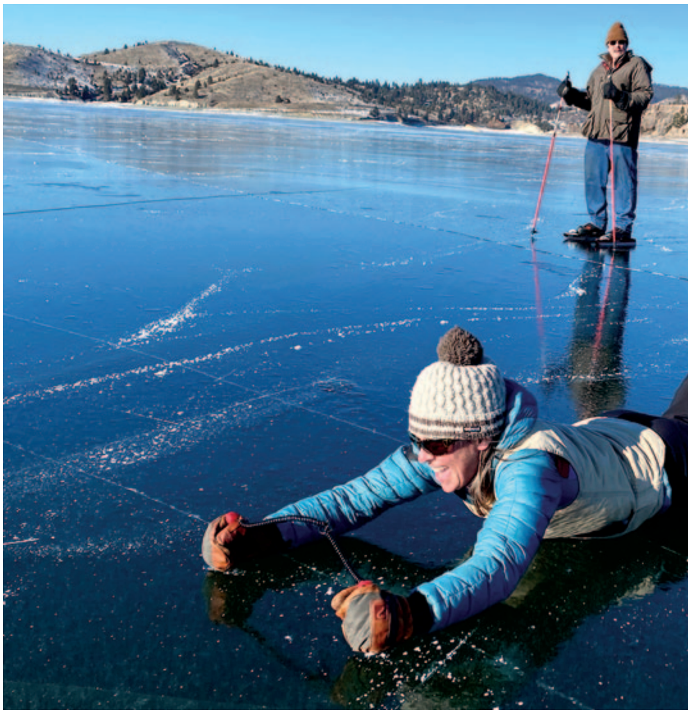
Linnea Schroeer is the FWP regional recreation manager in Bozeman.

seen before, so we hailed him and he stopped to chat. He said he was wearing Nordic skates, and demonstrated how they attached to his cross-country ski boots with ski bindings. He raved about how comfortable and stable they were, and urged us to get some.



SMOOTH GLIDING Top: Skaters wearing Nordic skates skim across Canyon Ferry. Center: Ice formations. Right: A skater practices using ice claws. Worn around the neck, the studded dowels help a skater pull herself out of open water if she falls through thin ice.

GOING ALL IN

Never one to dally, Mike went out the following Monday and bought us Nordic blades and bindings to go with the cross-country ski boots we already owned. We started following the Facebook group MT Ice Buds, and over the next several weeks began meeting other ice enthusiasts wherever skaters reported good conditions—cold temperatures that created hard, smooth ice topped with little or no snow. We spent most of our time on Canyon Ferry Reservoir and Hauser and Holter lakes, but also skated on Ennis Lake, the Helena Regulating Reservoir, and local ponds in Bozeman and Three Forks. One memorable weekend we covered more than 40 miles on Canyon Ferry alone, skating around Cemetery Island and exploring the western shore for miles. Ice Buds from across the state reported great skating conditions throughout much of Montana that winter.

Skating so much, we got serious about safety. We watched online videos about reading ice conditions and self-rescue techniques. We bought ice claws: spikes set in big dowels you wear around your neck and use to haul yourself out of the water and onto the ice if you fall in. Mike made us custom ice pikes: poles with sharpened, weighted ends we used to help judge ice thickness (you can also use hatchets or drills). We carried backpacks filled with throw ropes, a fire-starter kit, extra dry clothes, towels, food, and water.

The most valuable safety lessons we learned came from accompanying skaters with experience on Montana lake ice. They

PHOTOS: HOPE HARPER

READY TO NAIL IT A young figure skater sets up for a jump at sunset on Whitefish Lake. When conditions are right, wild ice can be as smooth as an Olympic skating rink. During some years—like the legendary winter of 2020-21—entire lakes and reservoirs freeze solid with no snow or undulations on top, allowing skaters to glide for miles.

PHOTO BY NOAH COUSER

HE SHOOTS, HE SCORES! Above: Playing pond hockey at Cutler Lake near Gardiner. Below: From January 1 through late February, Bannack State Park offers skate rental, semi-groomed pond skating, a rinkside fire for roasting marshmallows, and hot chocolate, coffee, and cider in the warming house.

welcomed us along and showed us various hazards we needed to avoid. That's the great thing about the ice-skating community: Everywhere you go you'll find wonderful people eager to coach beginners, watch out for each other's safety, and have fun together on the ice.

Ice skating isn't like hunting, fishing, or many other types of outdoor recreation, where other people can seem irked that your participation might detract from their experience or success. Sure, there are those who want wild-ice solitude and seek out areas with no one else around, but for most skaters we've met, being part of a growing community adds to the enjoyment.

FROM TOP: CAROL POLICH; MONTANA STATE PARKS

Montana may not be the first place people think of for ice skating, but it is steadily gaining in popularity.

EUROPEAN TRADITION

Ice skating has long been a social activity. The first skates were invented in northern Europe several thousand years ago to make it easier to cross frozen bodies of water. But by the 15th century, skating had become a popular winter pastime. Paintings from the 1800s show happy scenes of older couples skating arm in arm, children pulling each other in sleds, and raucous teens racing through crowds—all painted in the soft light of a northern midwinter day. The Netherlands

PAIR SKATING Above: Skaters soak up the winter sun on a frozen wetland near Whitefish. Even when covered with some snow, ponds and lakes can provide good skating if the ice is smooth beneath and at least 4 inches thick.

has long been famous for its inordinate supply of world-class speed skaters, as the country's plentiful canals are perfectly suited for ice skating. Skating was also popular elsewhere in northern Europe and in the British Isles, and immigrants from there brought their love of skating to North America.

Longtime skater Hope Harper, a fixture on Helena-area wild ice, grew up in Lennep, Montana, in the 1970s, skating on frozen beaver ponds, Voldseth Reservoir, and the Musselshell and Smith rivers. The whole community would come out to skate, she says, because it was something that nearly everyone could do outdoors during winter. Skating is low impact—unless you fall—so it's a great sport for all ages. It's also free, after a minor investment in skates and related gear.

Harper adds that because ice conditions change daily or even hourly, skating requires an attentiveness to weather, wind, temperature, and other aspects of nature. "Every time I go out, I learn something new," she says.

Which, for anyone dreading the monotony of Montana's long winters, is an enticement all its own.

FROM TOP: CHUCK HANEY; VIKTOR VRBOVSKY/ENGBRETSON UNDERWATER PHOTOGRAPHY

ICE, GOOD. WATER, BAD.

Longtime wild-ice skater Jim Barnes of Big Sky Cycling in Helena offers the following safety advice:

- Always skate with a companion if you are a beginner.
- Always carry ice claws (picks) outside of your clothing where they can be easily reached.
- Carry a throw rope with loops so someone in the water can easily grab it with cold wet hands.
- Carry a tool to check ice thickness such as a hatchet, drill, or ice pike. What is considered safe depends on several factors, but as a rule of thumb don't venture out on ice less than 4 inches thick. Clear ice (often called black ice) is denser and therefore safer than cloudy ice, which has lots of air bubbles. Thickness can vary greatly across a lake, so check often as you explore new ice. Look for changes in color, cracks, and texture.
- If you do fall in, kick your legs vigorously like you're swimming and get horizontal. That will make it easier to haul yourself onto the ice with your ice claws.
- If you encounter thin ice, turn around and go back the way you came, because that ice supported you previously.
- If you get wet, dry off and get warm as soon as possible. Always carry a dry pack towel, a change of warm clothes, and the means to start a fire.

Approach with caution!

Early season ice in November and December is almost always the best for skating. New ice is denser, smoother, and more uniform, with fewer seams and ridges. But ice can also be dangerously thin that time of year, so be sure to check thickness before lacing up.

The worst photograph I've ever taken

By Torrey Ritter

When I was in my 20s, I started really getting into photography. In 2007, I had just bought a new digital camera and was spending my days trying to sneak up on various wildlife species, hoping for that one epic shot. One spring day, I decided to hike, climb, and scramble up into a maze of rocky cliffs in a favorite Bitterroot Mountains canyon. At the top of a particularly narrow pathway leading into a cathedral of towering granite spires and cliffs, I pulled myself onto a precarious ledge. There, before me just 20 yards away, was a nanny mountain goat, perhaps with parasites or a disease causing hair loss, with a brand-new kid by her side.

Startled by my appearance, the nanny leapt up and scrambled up to a spot, shown in the photo at right, just above her baby. The kid, understandably freaked out, began wailing and bleating and desperately trying to climb up after its mom. But the rocks were too steep, and the tiny goat repeatedly tumbled down after each attempt.

This is the point where I should have immediately recognized the stress and fear I was causing these animals. I should have turned around and left the site as quickly as possible. But I had my new camera and got caught up in the moment. The nanny goat against the giant cliffs was just the stupendous shot I had been dreaming of. So I sat there for a minute or two framing dozens of shots, seemingly oblivious to the cries of the tiny mountain goat and the obvious stress to its mother.

When I got to the bottom of the cliffs and finally realized what I'd just done, I was furious and frustrated with myself. Out of context, I got the shot I wanted, a majestic mountain goat looking out over its domain. But in reality, what I'd photographed was an extremely stressed-out animal desperately trying to escape a threat without leaving its young to struggle on the cliff ledge below. It is in fact a truly horrible photograph, the worst I've ever taken. But it taught me a valuable lesson.

No wildlife photography is worthwhile if getting the shot causes an animal undue anxiety or harm. That's not only because we should strive to leave wildlife alone as much as possible, especially during sensitive times like breeding seasons, but also because a photo resulting from stressing an animal is deceitful. It may look like the photographer snuck up on the animal and captured a candid, natural moment unnoticed by the subject. But it is really just an image of an animal trying to get away from or otherwise being pressured by an intruding human being. It's completely unnatural.

I deleted all the photos I took of that mountain goat and its kid except this one. It's a reminder that if I am not portraying a totally natural moment, one where the subject animal is not reacting to my presence, then I am creating a falsehood.

As wildlife photography increases in popularity alongside the explosion of social media and the pursuit of likes and views, the notion of wildlife photography as a "nonconsumptive" form of outdoor recreation can become completely false. Stressing animals consumes their time, energy, and resources. Even a long shot taken with a telephoto lens can upset an animal if it sees, hears, or smells someone's presence.

We all have a responsibility to choose our photographic moments carefully and get the heck out of there if we come too close to an animal, especially when it's with its young. No photo is worth taking if in doing so we harm, if even slightly, the very wildlife we all value and hope to immortalize with our camera.

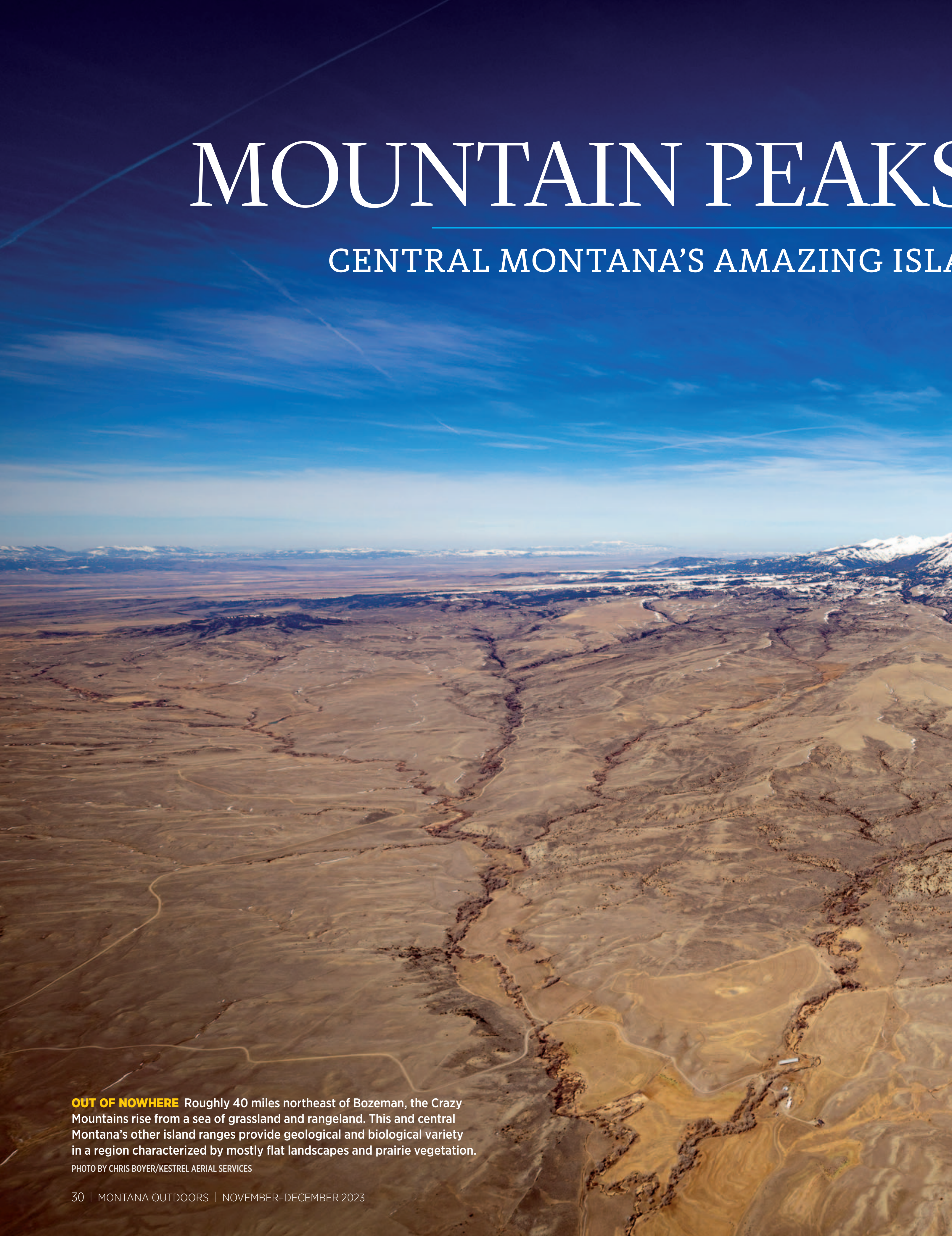
Don't be a 2007 Torrey. If you accidentally get too close, grab a mental image of the rare moment you came across and then leave as quickly as possible. You'll feel better for it, and undoubtedly the animal will too.

Torrey Ritter is FWP's regional nongame wildlife biologist in Missoula.

REJECTED

MOUNTAIN PEAKS

CENTRAL MONTANA’S AMAZING ISLA



OUT OF NOWHERE Roughly 40 miles northeast of Bozeman, the Crazy Mountains rise from a sea of grassland and rangeland. This and central Montana’s other island ranges provide geological and biological variety in a region characterized by mostly flat landscapes and prairie vegetation.

PHOTO BY CHRIS BOYER/KESTREL AERIAL SERVICES

S IN A PRAIRIE SEA

AND RANGES ★ **BY E. DONNALL THOMAS, JR.**

FALL SPLENDOR The Judith River flows northeast from the Little Belt Mountains toward the Missouri River past the South Moccasins, shown here, and the Judith Mountains.

LORI THOMAS

Mid-September in central Montana often looks and feels like early August, despite the start of fall looming just a week or two away. Today, the temperature is hot enough to have left me sweaty after an easy uphill hike, and the arid landscape below lies painted in late summer shades of ocher. Yet the seasonal clock is ticking, and soon our first hard frost will remind us of winter's inevitable arrival.

My shotgun, bird dog, and desire for a dusky (blue) grouse dinner motivated this morning's climb, but now the view alone proves reward enough. From Collar Peak on the northern edge of the Judith Mountains, the overlook makes me feel like I'm on the top floor of a skyscraper looking down on the world. Conifers and scree confirm that I'm standing on a mountain, but most mountains love company, and no others lie between me and the Little Rockies 65 miles away across the Missouri.

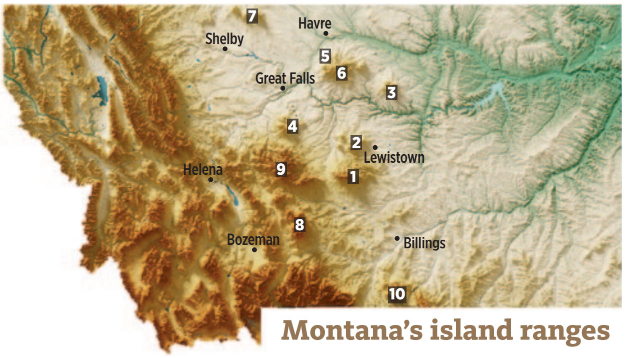
The Judiths and the Little Rockies are among central Montana's island ranges, so named for their metaphoric resemblance to dots of land scattered across open ocean. While isolated from one another by definition, they share common geology, history, and significance to the people who know them.

All lie east of the Continental Divide, separated from the Rocky Mountain Front and each other by relatively flat, open terrain. Not everyone agrees on which ranges belong in this family. Geologist Lee Woodward identified the Big Snowies, Judiths, North and South Moccasins, Highwoods, Little Rockies, Bear Paws, and Sweet Grass Hills as island ranges, while others include the Crazies and Little Belts. Encircled by grassland habitat at elevations of 4,000 to 5,000 feet, some of these isolated mountains rise as high as 8,600 feet in the Big Snowies (Greathouse Peak) and 11,200 feet in the Crazies (Crazy Peak).

BULGING UNDER PRESSURE

Since the geology is important and most of these mountains share a common origin story, let's go back to the very beginning.

During the Paleozoic era—approximately 300 million BCE (before common era)—shallow seas covered most of Montana. Layers of sandstone, limestone, and shale remained when the water receded. During the Cretaceous era some 250 million years later, molten rock under pressure deep belowground began to push upward through the overlying crust, forcing huge plates of rock aside to form the Big Snowies, the lone island range formed by what geologists call "overthrust."



1. Big Snowy Mountains
2. Judith Mountains
3. Little Rocky Mountains
4. Highwood Mountains
5. North and South Moccasins
6. Bear Paw Mountains
7. Sweet Grass Hills
8. Crazy Mountains
9. Little Belt Mountains
10. Pryor Mountains

The rest are laccoliths, created when a sill (a horizontal layer of molten rock, or magma) bulged upward under pressure, moving the overlying crust ahead of it 50 million years ago.

Around 2 million BCE, sequential ice ages began. Glacial movement and streams generated by melting ice eroded the sedimentary layer on top of the upthrust rock, providing finishing touches to the island ranges we know today.

This ancient history explains how mountains—like the one I stood on that September morning—formed in isolation and in such stark contrast to the plains surrounding them. Similar geological forces also produced island ranges in other states, like South Dakota's Black Hills, the Wichita Mountains of southwestern Oklahoma, and Wyoming's Bighorns.

ISLAND LIVING

While geology is central to understanding island ranges, rocks are still just rocks. The story grows more interesting when the focus shifts to wildlife and people.

Abundant pictographs in many island ranges confirm their importance to Indigenous culture. The mountains served as landmarks and lookout points and as sites of vision quests and ceremonies such as the Sun Dance, still held each year in the Fort Belknap Reservation's Little Rockies. Not surprisingly, the first written description of Montana's island ranges came from Lewis

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A longtime contributor to Montana Outdoors, *E. Donnall Thomas, Jr. lives in Lewistown*

HUMAN IMPRINTS Above left: Pictographs along the Smith River in the Little Belt Mountains are reminders that people have been living in Montana's island ranges for thousands of years. Early pioneers couldn't farm the steep hillsides, but they found silver, gold, and gems in some of the prairie mountains. Above right: The Zortman-Landusky mine in the Little Rocky Mountains, where gold was discovered in 1868. Right: Ruby Gulch Mine near Zortman, circa 1910. Harmful residue from century-old mining operations in Zortman and Landusky require the state to treat water flowing into the Milk and Missouri rivers and Fort Belknap Indian Reservation.

CLOCKWISE FROM TOP LEFT: JEREME HOLLMAN; CRAIG & LIZ LARCOM; MONTANA HISTORICAL SOCIETY; KEVIN SCHUMAKER/GEMOLOGICAL INSTITUTE OF AMERICA

and Clark. On May 25, 1805, on the Missouri River upstream from the mouth of the Musselshell River, William Clark wrote, "I saw mountains on either side of the river at no great distance. These mountains appear to be detached." To the north were the Little Rockies and to the south, the Judiths.

The Judith River, flowing north past the latter mountains, received its English name four days later where it entered the Missouri. Wrote Meriwether Lewis: "Captain Clark, who ascended this river much higher than I did, thought it proper to call it Judith's River." This tribute honored Clark's fiancée, Julia, whom he often called Judith. Had Clark used his beloved's formal name, the mountains north of my home might have become the Julias.

The arrival of more European Americans from the East soon brought change. The same geological forces that created the laccoliths carried gold and silver to the surface, along with gemstones like the Little Belts' famous Yogo sapphires. By the end of the century, extensive mining operations were underway at Zortman (Little Rockies), Kendall (North Moccasins), and Maiden (Judiths). All but the first are now ghost towns. The people are long gone, but the mining companies left behind piles of mining waste that exposes pyrite-rich ore to oxygen, creating a chemical reaction that produces sulfuric acid, which leaches into nearby streams, killing insects and fish.

A RARE GEM One of Montana's two state gemstones, the cornflower blue Yogo sapphire is found only in Yogo Gulch in the Little Belts.

ALL ALONE

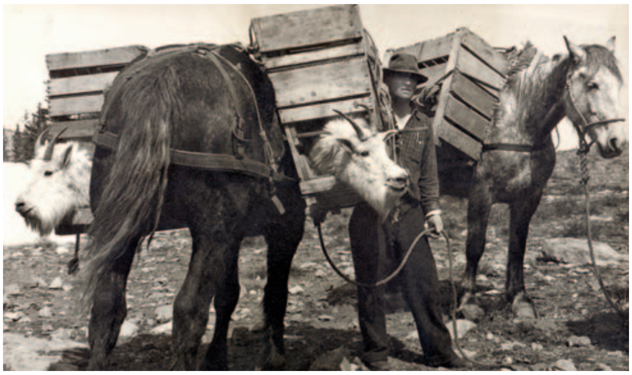
Some terrestrial wildlife have a tough time on island ranges. They can't easily move elsewhere if conditions sour. And their isolated populations lack genetic diversity, making them less able to endure environmental calamities and compete with more adaptable invasive species.

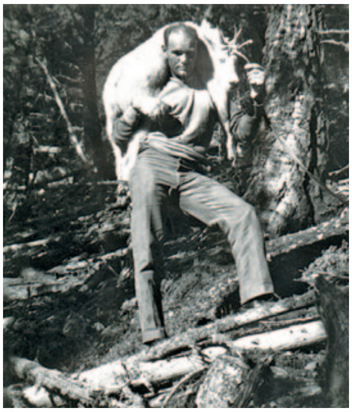
Mountain goats historically inhabited many western Montana mountains, but there are no records of their historical presence in the island ranges, despite ideal habitat. That's because mountain goats couldn't cross from, say, the Bridger Range to the Crazies without being eaten by wolves and other prairie predators.

Starting in the 1940s, what was then called the Montana Fish and Game Department began trapping the goats and trucking them to appropriate habitat around the state, including the Highwoods, Big Snowies, and Crazies. The mountain goats generally thrived in their new homes. In fact, the annual mountain goat hunting harvest in island ranges now exceeds that in the species' native Montana mountains. Populations in the Crazies and Highwoods have fared particularly well, though the Snowies herd failed, likely due to a lack of genetic diversity.

Cutthroats, both the westslope and Yellowstone subspecies, are Montana's only native trout east of the Continental Divide. Because trout need cold, clear water, mountain streams have always provided core habitat. Many small creeks in the Little Belts, Judiths, Highwoods, and Snowies once sustained populations of these iconic fish. The old Fish and Game Department (abetted by unauthorized "bucket biologists") introduced non-native rainbow, brook, and brown trout to many of these waters that either outcompeted or hybridized with the native salmonids. "There are unfortunately few instances in which fish introduced to these drainages have not reduced the number or even eliminated aboriginal cutthroats," says Clint Smith, Montana Fish, Wildlife & Parks fisheries biologist in Lewistown.

Wild turkeys represent a more successful introduction program. They were historically absent from Montana, likely because they could not survive deep snow and cold temperatures until farmers began raising corn, alfalfa, and other calorie-rich foods that helped the birds get through the winter. In





GOAT INTRODUCTIONS During the 1940s through '70s, wildlife crews transplanted mountain goats to several island mountain ranges. Vulnerable to predators on open grasslands, mountain goats could not colonize the ranges on their own. Crews captured the animals in nets then carried, carted, and drove them to suitable habitat in island ranges, where many populations are thriving today.

1954, Fish and Game released 13 wild-caught Colorado turkeys in the foothills of the Judith Mountains, at a location I can see from my deck. The birds thrived. Aided by further transplants, wild turkeys now inhabit many locations around the state, especially in the conifer-parkland habitat of the island ranges, though for uncertain reasons the big birds didn't take to the Little Belts.

Pioneering ecologist Aldo Leopold observed that wildlife thrives along edges. Open savannah is the world's richest wildlife habitat—consider the estimated tens of millions of bison that once roamed the Great Plains—and within this grassland sea, island ranges create just the kind of edges Leopold describes. Many are steep and rugged, and, because of their relative inaccessibility, provided refuge for species such as elk and bears as human development displaced them from the open terrain where Lewis and Clark described them in such abundance.

PUBLICLY OWNED

People also benefit from habitat diversity—especially those of us who live here for the remarkable outdoor opportunities Montana has to offer. As patterns of land use and ownership change, access to public lands becomes increasingly more important. Fortunately, most of the island mountains wound up owned by all of us because no one else wanted that land during the agriculture-driven Homestead Era. It's hard to grow grain in soil so devoid of moisture, much less atop a laccolith. As a result, the ranges are distinct from their surroundings not just due to geology and forest habitat, but because they include so much public property managed by the U.S. Forest Service, Bureau of Land Management, and State of Montana.

Unfortunately, our ability to see a mostly publicly owned mountain rising up in the distance does not guarantee access to it. Though it's possible to drive around most island ranges in a morning, roads transecting them are few. What's more, most state and federal tracts are enclosed to varying degrees by private property whose owners may not grant access to public land beyond their boundaries. Fortunately, careful study of topographic and land-ownership maps can direct visitors to starting points accessible by vehicle, after which a good hike can get you deep into public property.

ON GOLDEN TRAIL Hikers head into the Big Snowy Mountains. Island ranges provide mountain recreation that helps boost local economies.

The island ranges' limited road access produces a paradox: inconvenient at times, but also providing a remote and often solitary wilderness experience.

These mountains enrich our lives in intangible ways. At first glance, eastern Montana prairie may not seem as spectacular as the peaks farther west. But we who live here value it in its own way. Many of us also enjoy mountain hikes, ice-cold mountain streams, and timbered ridges, and the island ranges provide opportunities to enjoy these important aspects of the Montana outdoor experience close to home. If they weren't here in central Montana, many of us likely wouldn't be either.

UNIQUE WILDERNESS

Great Falls resident Mark Good became well acquainted with island ranges during the 26 years he focused on the sites while working for the Montana Wilderness Association (now Wild Montana). "These mountains don't get the attention they deserve," he told

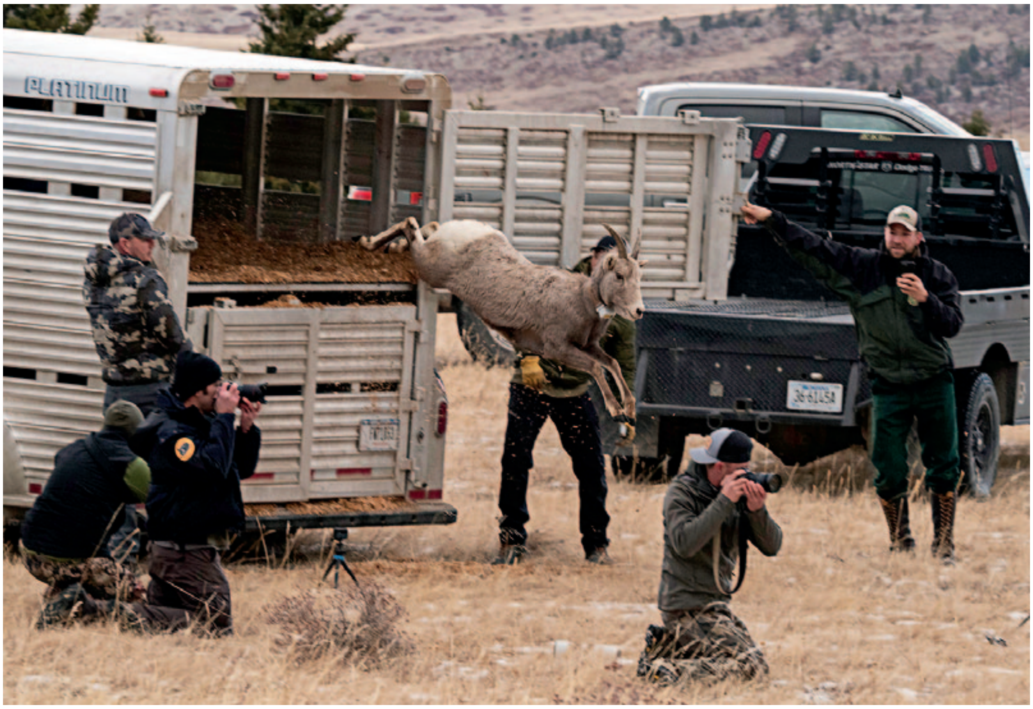
CLOCKWISE FROM TOP LEFT: MONTANA FWP; DAN NICHOLS; LISA WRIGHT; MONTANA FWP

HIGH AND LOW Birdtail Butte and foothills in the Bear Paw Mountains (above) and Lost Lake in the Shonkin Sag, a glacial landform at the foot of the Highwood Mountains (below) show some of the scenic beauty and geological variety found in Montana's island ranges.

FROM TOP: JOHN LAMBING; ROLAND TAYLOR

ISLAND LIVING Clockwise from top: Mixed-grass prairie surrounding the Sweet Grass Hills; sunrise over the Crazy Mountains; the author hunting sharptails in the North Moccasins; waterfall at the Crystal Cascades trailhead in the Big Snowies.

CLOCKWISE FROM TOP: JOHN LAMBING; STEVEN AKRE; LORI THOMAS; DEE LINNELL BLANK



HOMECOMING With support from the Wild Sheep Foundation and its state affiliate, FWP reintroduced bighorn sheep into the Little Belt Mountains with an initial release in 2021 of 49 animals captured in the Missouri River Breaks. Ancient pictographs in caves and on cliffs show that wild sheep previously occupied the Little Belts, which contain ideal habitat for the high-elevation animals.

me recently. "Each range is different, with its own personality and history. Most people associate Montana wilderness with vast areas like the Bob Marshall, but the island ranges offer their own unique versions of wilderness experience."

For its part, FWP has been working to restore bighorn sheep and American martens to island ranges where they were historically present. (Learn more in the *Montana Outdoors* articles "Cautiously Bringing Bighorns Back," September-October 2021, and "Martens Come Home," November-December 2022.)

UNIQUE WILDERNESS

It's now mid-January, and the change in seasons I contemplated in September from the top of the Judiths has definitely arrived. Today's view consists of snow-laden ridges rolling away to the west of my hard-earned position high in the Little Belts. The initial motivation for today's climb was a mountain lion track, although if my hunting partner and I do catch up to the cat (hardly a given), I don't plan on shooting it with anything but my camera. The real value of today's excursion is the pleasure of enjoying island range backcountry during winter, alone save for the lion hounds and a hunting partner who has somehow wandered off the track. As it often does, solitude has made me think.

What does the future hold for these mountains? For reasons ranging from socioeconomic to environmental, Montana is undergoing rapid change. Ever since first European contact, the people living here have found abundant ways of messing up our mid-state mountains, from conducting irresponsible mining practices to eliminating species that should be here and introducing others that shouldn't.

Giving me some optimism is the fact that central Montana's island ranges have resoundingly withstood the test of time. I like to think that, given thoughtful management on our part, these prairie peaks will be around for another 50 million years.

Accessing the island ranges

Vehicle routes to public land in the island ranges:

Little Belts
Deadman's Creek/South Fork Rd. (SW of Hobson); U.S. Hwy. 89 (SE of Monarch)

Big Snowies
Crystal Lake Rd. (S of Lewistown); Red Hill Rd. (SE of Lewistown)

Judiths
Ruby Gulch Rd. (NE of Lewistown); Maiden Rd. (NE of Lewistown)

Little Rockies
Landusky Rd. (S of Harlem); Seven Mile Rd. (SW of Malta)

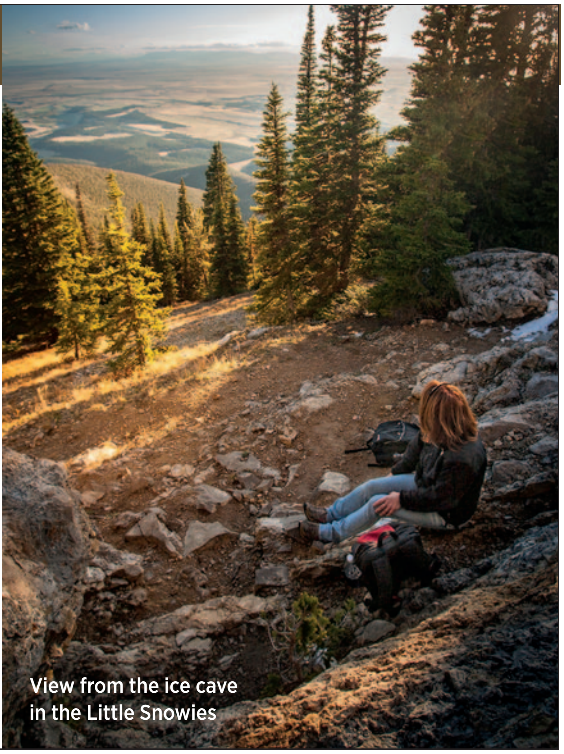
Highwoods
Upper Highwood Creek Rd. (E of Great Falls)

Bear Paws
Bull Hook Rd. (S of Havre)

Crazies
Big Timber Canyon Rd. (NW of Big Timber); Shields River Rd. (NE of Wilsall)

North Moccasins
N. Kendall Rd. (N of Lewistown)

Note: The South Moccasins are effectively landlocked by private property. Access to the Crazy Mountains is subject to intense controversy and should be monitored for current information.



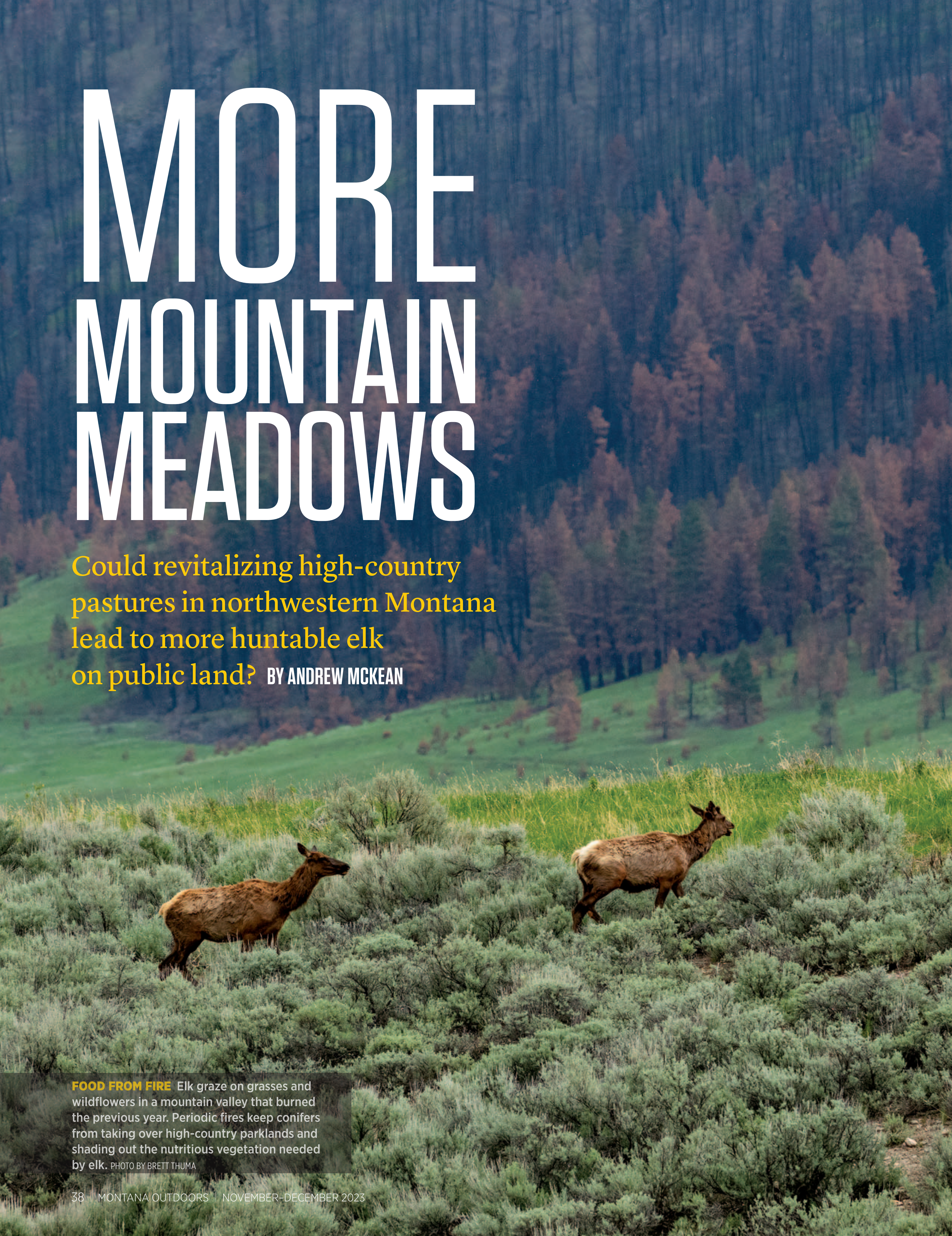
View from the ice cave in the Little Snowies

CLOCKWISE FROM TOP: LORI THOMAS; ROLAND TAYLOR; LORI THOMAS

MORE MOUNTAIN MEADOWS

Could revitalizing high-country pastures in northwestern Montana lead to more huntable elk on public land?

BY ANDREW MCKEAN



FOOD FROM FIRE Elk graze on grasses and wildflowers in a mountain valley that burned the previous year. Periodic fires keep conifers from taking over high-country parklands and shading out the nutritious vegetation needed by elk. PHOTO BY BRETT THUMA

Dave Wrobleski paints a lovely scene when describing classic elk summer habitat in the Northern Rockies. "I picture a mosaic of scattered larch, spruce, and subalpine fir above cool, shady streams, and below open ridges dominated by grass that stays green well into summer," says Wrobleski, a Lolo National Forest district ranger. "It has a diversity of flowering plants, and maybe some young aspen stands, too."

Unfortunately, that scenic high-country landscape doesn't exist much anymore, at least not across a wide sweep of western Montana and northern Idaho. On the Lolo National Forest surrounding Plains and Thompson Falls, those summer elk pastures are small and getting smaller and drier by the year. Hot summers bake the high country while conifers creep in from the edges. As these subalpine parks get dried out and shaded in, they lose the nutritious grasses, tasty wildflowers, and succulent shrubs that fatten elk, as well as the boggy spots favored by wallowing bulls during September's rut.

The implications of this loss have only recently been reckoned, as researchers discover that productive summer range—in addition to the low-elevation winter habitat that has dominated hunters' and biologists' thinking for decades—is responsible for healthy calves and robust herds, as well as happy hunters and landowners.

"We're learning even more about how female elk that have access to high-quality forage in August and September not only get pregnant at higher rates than those with poor summer forage, but have a better chance of getting through a tough winter," says Rebecca Mowry, an FWP wildlife biologist whose district includes the Bitterroot Valley south of Missoula. "And her calf typically has better survivability, too."

In other words, these mountain meadows are the engines of population growth in a region seeing widespread declines of its previously abundant elk herds. Elk in western Montana hunting districts with plenty of high-elevation national forest land—the Purcell, Salish, Bob Marshall, Sapphire, Garnet, and West Fork Bitterroot—are all below FWP population objectives.

It's not that western Montana lacks nutritious elk habitat in summer. Far downhill in most river valleys, irrigated alfalfa and cereal grains can provide plenty of calorie-rich food. Increasingly, that's where elk descend during the warm months, making themselves unwelcome in a hurry. Landowners and wildlife managers alike would prefer that mountain elk, hard-wired to migrate uphill each spring, graze the high parks and meadows that Wrobleski so poetically describes.

The trouble is, in recent years wildlife biologists and forest managers haven't found a way to maintain these high, wild gardens watered by snowmelt and bathed in sunlight that coaxes up bunchgrass, potentilla, and aspen daisies. So elk head downhill.

BUILDING FAT RESERVES Lush, abundant summertime food is essential for helping elk—especially young ones—survive Montana's harsh winters.

That didn't used to be a problem. For most of the past century across western Montana, commercial logging opened up enough of the forest canopy to stimulate greening vegetation that kept elk in the high country until deep snow or hunters pushed them lower. Historically, fires sparked by lightning or strategically set by American Indians kept trees out of mountain meadows and allowed the nutritious grasses and forbs to bloom and grow.

But public-land logging operations have declined almost as precipitously as western Montana's elk population. According to the Montana Bureau of Business and Economic Research, timber harvest in national forests during the 2010s was just one-third that of the 1980s and '90s. Depending on who you ask, the cause ranges from federal environmental and endangered species regulations to competition from Canada. Meanwhile, almost all wildfires are suppressed lest they turn into uncontrollable infernos that burn through entire mountain ranges and threaten the growing number

CLOCKWISE FROM LEFT: LEA FRYE; DAVID M. RICHARDS; SAM BELANGER

SUMMERTIME SWITCH Historically, mountain elk spent summer and fall in lush, nutrition-rich high-country meadows (above) kept open to sunlight by periodic wildfires and also, in the first half of the 20th century, clear-cut logging. But in recent years, as high elevations dry up and more landowners install irrigation pivots in low-elevation cropland, many herds have moved downhill to private valley pastures—and stay there year-round (below). This puts them beyond the reach of public-land hunters and creates crop depredation and fence damage on valley ranches.

of houses popping up in forests.

The result? National forests in western and northwestern Montana are full of hikers, mountain bikers, anglers, and hunters, but contain far fewer elk than 30 or 40 years ago. Making things worse are western Montana's increasingly parched summers, which sap mountain meadow habitat of its nutritional value.

"A hot, dry summer followed by a hot, dry fall followed by a tough winter is when we really see the impacts of depleted forage," Mowry says. "You have low birth rates, and high overwinter mortality of calves. It's the triple threat, and it all starts with poor nutrition on those summer ranges."

SUMMER FORAGE CONNECTION

Much of the research highlighting the importance of abundant summer mountain habitat for elk has been led by Dr. Kelly Proffitt, FWP's senior wildlife research biologist. Her initial investigation into the relationship between forage and elk distribution started in 2009 as a predator-prey study in the upper Bitterroot Valley, spurred by local concerns about declining elk numbers.

"The first year showed elk pregnancy rates of 57 percent, in an area where we'd expect them to be 90 percent," says Proffitt. "The department decided that instead of focusing solely on predation, which we were doing, maybe we should also better understand habitat and habitat quality. Our resulting research showed strong evidence that populations exposed to different qualities of forage on their summer range correlated to pregnancy rates the next winter."

Additional research in the Sapphire Mountains, the Blackfoot-Clearwater area, and the Elkhorn Mountains over the past decade further confirmed the connection between summer forage and both pregnancy rates and overwinter survival. This year, Proffitt is focusing on elk in the Kootenai National Forest south of Noxon.

The overarching conclusion of Proffitt's work—and studies by researchers in northern Idaho—is that much of what drives elk population dynamics in the Northern Rockies happens in the summer, says Justin Gude, FWP's research chief. "For a generation or more, wildlife managers have focused on conserving winter range because everyone knew that winter is the time of highest mortality, and that these areas were being lost to housing developments, agriculture, and other land use changes," says Gude. "And while winter habitat remains important, we're now learning that the potential for population growth is entirely affected by summer habitat, by the amount and the quality of forage available to elk. That becomes even more important the farther west you go in Montana."

LISA BALLARD

> "While winter habitat remains important, we're now learning that the potential for population growth is entirely affected by summer habitat, by the amount and the quality of forage available to elk."

FWP's recently released elk management plan stresses the connection between summer nutrition and herd health. "The plan definitely makes clear that elk body fat levels in spring are a function of fat levels from the previous fall," says Lindsey Parsons, author of the massive management document. "The plan cites studies by Kelly and other researchers that show how summer nutrition can affect pregnancy rates, adult and calf body size, and the amount of fat that elk accrue to help get them through the winter."

Gude stresses that this insight isn't new. "For years, scientists have known about the connection between the summer forage and herd productivity," he says. "But what we know now has become far more precise and detailed, thanks to recent work conducted in Montana and other western states."

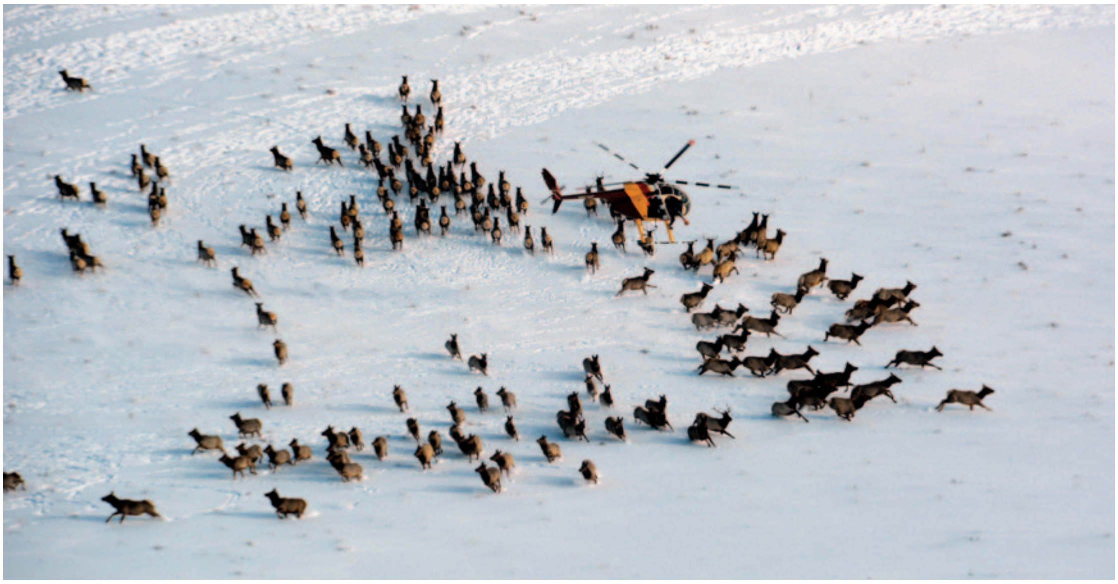
CLEAR-CUTTING NO MORE

In the past, productive summer elk habitat was a by-product of aggressive logging that included far more clear-cutting that opened the forest canopy. Because that's no longer happening, "mountain forage for elk isn't a given anymore," Gude says. "Now we're looking for new ways to produce more of that habitat."

Because FWP wildlife biologists have no say over forest management, any actions are largely in the hands of national forest supervisors. Fortunately for elk fans, many of those officials have been closely following Proffitt's research. The Lolo National Forest's draft revised management plan specifically mentions improving subalpine meadows and parks to benefit elk and other wildlife. The Bitterroot National Forest, too, is reconsidering management priorities for subalpine meadows.

Manipulating habitat at a scale large enough to affect elk numbers is difficult at higher elevations, given the steep grades, short working seasons, remote locations, and few roads. It's also hard to get what land managers call "habitat treatments"—which might include livestock grazing or logging—approved through the Forest Service's review process. Proposals are regularly nixed by federal judges citing environmental laws. What's more, a century of fire suppression has created dense, tinder-dry forests, making it difficult to contain prescribed burns. Lastly, there's little commercial value for the scrawny timber that might be cut in high-elevation thinning projects.

The hunting editor at Outdoor Life, *Andrew McKean lives on a small ranch near Glasgow.*



FIND, NET, COLLAR, FOLLOW Top: Elk graze on new growth in a mountain meadow in early spring. Left: A helicopter with Quicksilver Air, which FWP contracts for elk captures, hovers over a herd as a gunner positions himself to fire a net onto a cow. Below left: Dr. Kelly Proffitt, FWP senior research scientist, takes the temperature of an elk after it has been netted, tranquilized, hooded, and fitted with a tracking collar. Below right: Proffitt fits a collar on another cow. By tracking elk, she and other researchers learn which habitats elk prefer throughout the year. National forest managers are using the information to adjust management plans to create more open mountain meadows.

TOP: RICHARD J. JACKSON; MIDDLE AND BOTTOM PHOTOS: MORGAN JACOBSEN/MONTANA FWP

> “So even if we can find ways to restore high-elevation pastures…elk born on that low-elevation land who have never left that property and experienced seasonal migrations might have no idea the habitat is up there and how to reach it.”

CHALLENGING YET ESSENTIAL TOOL Prescribed fires can burn back conifers taking over mountain meadows. But western forests have become so dry from record heat that controlled burns can escape their boundaries and threaten housing and other human development.

MIGRATION MEMORY LOSS

Another result of fewer and smaller high-mountain pastures is that elk could lose their historical knowledge of ancient migration routes across the Northern Rockies.

Mountain elk historically winter in low-elevation valleys. In spring they head uphill, sometimes traveling more than 100 miles. Then in early winter, deep snow drives them back downhill again. And so the cycle goes, generation after generation.

But if elk don’t venture to higher habitats, grazing national forest meadows into September and October, they aren’t accessible to public-land archery and firearms hunters.

Elk that remain in private, irrigated valley-floor sanctuaries are not only protected from public hunters but tend to have better forage in fall and winter. They also have higher birth rates. But Proffitt fears that repeat generations of alfalfa-fed elk may mean some animals never learn how and where to find historical mountain summer range and pass that knowledge to their young. “So even if we

CARNIVORES AND CLEAR-CUTS

Adding to the pressures on northwestern Montana’s elk are increasing numbers of black and grizzly bears, wolves, and mountain lions. While those predators don’t normally have a big influence on elk abundance in healthy herds, they can disproportionately pare down diminished populations, where every calf is critical to herd viability.

A new multi-year study by FWP’s Dr. Kelly Proffitt and University of Montana researchers is looking at the extent to which both habitat *and* predators affect elk numbers. In the winter of 2022-23, scientists began tracking radio-collared elk and large carnivores along the lower Clark Fork River. They are focused on Hunting District 121, which surrounds the river from Thompson Falls northwest to Heron and the Montana-Idaho border.

Biologists capture and collar a mountain lion in HD 121 last winter as part of the new multi-year study.

Proffitt and her colleagues will also examine the effects of timber management on elk habitat and elk productivity over various periods of time. Researchers are working with the U.S. Forest Service to look at harvested tracts 15, 25, and 50 years after logging to measure how elk respond to different post-harvest habitat conditions.

“We’re hoping to better understand elk population dynamics in northwestern Montana by studying top-down influences like predation and bottom-up influences like habitat,” Proffitt says. ■

Wildlife research scientist Jesse DeVoe collars a baby elk in HD 121 near Noxon as part of the FWP study to learn what factors most affect calf survival.

TOP: LANCE GILLILAND; LEFT AND FAR LEFT: MONTANA FWP

STAY PUT! Wildlife managers, cattle ranchers, and hunters all want elk to stay in mountain parks in the fall. Using FWP research, national forest managers are now finding ways to reinvigorate these high-elevation grasslands to keep elk up high where they are more available to public-land hunters and do less crop damage on private property.

JACK BALLARD

can find ways to restore high-elevation pastures, and we then increase hunting pressure on private-land elk to drive them uphill, elk born on that low-elevation land who have never left that property and experienced seasonal migrations might have no idea the habitat is up there and how to reach it," she says.

Proffitt suspects the multi-generational behavior that selects for resident private-land elk herds may already be established in some herds.

That's an added conundrum for elk managers, Gude says. But the more immediate problem is finding ways to make high-elevation parks more attractive to elk. "We obviously can't control precipitation to make mountain meadows more lush, and it's hard to imagine widespread logging will return to national forests," he says.

Despite its many complications, fire seems to be the best solution. "That's a constant we have found repeatedly in different studies including the Bitterroot, Northern Sapphires, and Blackfoot-Clearwater. Wildfire creates good forage, and elk use it," Gude says. "The amount of digestible energy in native forage following a wildfire is comparable to that of an irrigated alfalfa field. Elk select for it in the year after a fire and for at least the next five years."

> "Could we retrain elk to return to public lands? I think so, but it won't happen without coordinated intervention, and in some areas and with some herds, it's possible that we're already too late."

COORDINATED INTERVENTION

Yet fire alone won't solve Montana's elk-distribution problem. The rise of ATVers, mountain bikers, hikers, and campers on national forests make it increasingly difficult for secretive elk, mule deer, moose, and other wildlife to follow historical migration routes to public lands. The Forest Service, recognizing the lack of escape cover in middle and higher elevations, promotes creating a "diversity of elk habitat that provides ecological conditions that supplement recreational opportunities that include wildlife enjoyment, viewing, and hunting" in its new forest-management plans. Those conditions might include creating big-game security areas, limiting human access during certain times of the year, and managing fire in ways to specifically improve the high meadows that elk need.

The management implications are not lost on Proffitt, who spends her time designing research projects, collaring elk, and monitoring their movements. "In both the most recent FWP elk management plan and in the Forest Service plan revisions, there's alignment between the agencies," she observes. "What if we could work with the Forest Service to improve the forage quality? Would elk be more likely to stay on public lands? With focused hunting pressure on private lands, could we retrain elk to return to public lands? I think so, but it won't happen without coordinated intervention, and in some areas and with some herds, it's possible that we're already too late."

Wolverine Watcher

An 83-year-old volunteer is changing what we know about the state's rarest large carnivores.

By Sierra Cistone

Don Heffington straps a few dozen pounds of frozen deer meat to the back of his snowmobile, then starts up the engine. On this cold April morning, the snow is too deep to drive his truck any farther into the Beaverhead-Deerlodge National Forest's Pintler Mountains, 60 miles west of Butte. Now, on the snowmobile, he starts a 10-mile journey even deeper into the backcountry.

Along the way, Heffington stops to point out a wolverine's old, faint tracks. It's a reminder that even in these remote and snow-covered mountains, a few species are able to survive and even thrive. Among them are the two rarely seen carnivores—wolverines and Canada lynx—that provide the reason for today's snowmobile outing.

The 83-year-old Butte resident has been volunteering for Montana Fish, Wildlife & Parks for seven years, spending most winter weekends monitoring the elusive carnivores. Deer meat attracts them to remote camera traps triggered by movement. By examining the digital photos over the years, Heffington has put together an intimate story of one population of wolverines and documented the first and only known Canada lynx in this national forest.

PERFECTING A SYSTEM

Despite his vast knowledge of wolverines, Heffington is not a wildlife biologist. During the week, he manages rental properties in the Butte area and refuses to consider himself retired. But on the weekends, he heads into the mountains.

Working in cooperation with FWP, he spends entire days in the field—snowmobiling, snowshoeing, and setting up bait stations. Over the years, he has perfected a unique system of camera trapping that allows him to identify individual wolverines. The system involves using downed timber found on site to build an elaborate frame that acts as a ladder for wolverines to reach bait that's hung overhead. The frame is slightly wider than an average wolverine and is placed so that as an animal climbs, it must splay its legs, revealing its underside to the cameras.

Through a genetic quirk that may be specific to this population, wolverines in the northern range of the Pintlers have especially ornate white markings on their chest, belly, and neck. Heffington compares the markings, unique to each individual wolverine, to a fingerprint. The underside can also

PHOTOS: SIERRA CISTONE

FOREST CARNIVORE SERVICE Don Heffington looks for a trail camera he previously installed on a tree in the Pintler Mountains. The Butte resident has spent the past seven years as a volunteer for FWP, setting cameras out across the range to collect photos of wolverines and Canada lynx for the agency.

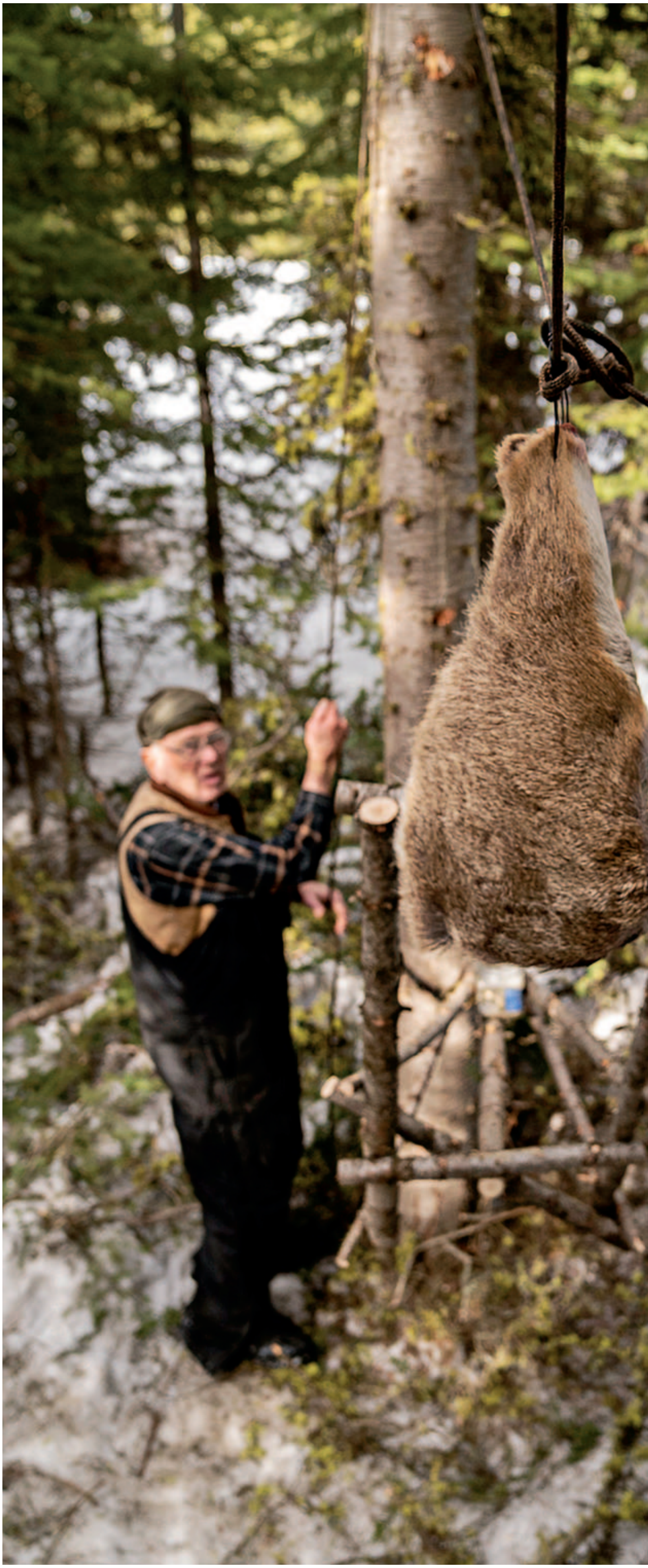
reveal the animal's sex and, if female, whether it is lactating. Knowing the sex, reproductive status, and who's who in the population has allowed Heffington to construct a northern Pintlers wolverine family tree.

The genealogy starts with a matriarch that Heffington caught on camera in 2018. Her markings resemble two bite marks in her white chest fur, so Heffington named her Two Bit. Photographs showing Two Bit's exposed teats document her raising a litter of kits every year since. Most of the young wolverines are never caught on camera, but one kit has been a regular at the trail cameras. Heffington named her Tubesock because of her white feet, and she went on to raise at least two litters of her own. Though wolverines are thought to be territorial and solitary, Two Bit and Tubesock have overlapping territories.

Heffington talks about each individual wolverine like he knows them personally, and his refrigerator is adorned with photos

MONEY SHOTS Above and right: Heffington looks at images of individual wolverines taken from his trail cameras. On his phone is a shot of a Canada lynx, the first confirmed sighting in the Beaverhead-Deerlodge National Forest.

IF YOU BUILD IT, THEY WILL COME Counterclockwise from top: Heffington hauls 50-plus pounds of gear into the camera sites. Included is a roadkill deer haunch he scavenged from a local highway then rigged with wire for hanging, a small saw for cutting branches to construct the frame that forest carnivores must climb to reach the meat, a portable drill for assembling the structure, trail cameras to record the visits, and rope to hoist the bait.



ALL PHOTOS SIERRA CISTONE; EXCEPT RIGHT: KALON BAUGHN

from his camera traps. “I’ve never seen a wolverine in the wild,” he says. “But taking these pictures all these years, you feel kind of a kinship to each one.”

“HERE’S SOMEONE REALLY INTERESTED”

Heffington was inspired to monitor rare forest carnivores after seeing a call for volunteers in the local newspaper in 2016. That first year, he helped with a multi-state effort to estimate where and how many wolverines were in Montana, Idaho, Wyoming, and Washington. At the time, Heffington had never before been on a snowmobile and knew little about Montana’s rare forest carnivores. But the experience was addictive, and he offered to continue monitoring the same area the following year.

Vanna Boccadori, FWP’s Butte-area wildlife biologist, remembers Heffington walking into her office that first year. “It didn’t take long to realize that here’s someone who’s really interested, beyond just reading books, someone who wants to learn more about this particular species,” she says.

Boccadori has remained Heffington’s main FWP contact the past seven years, and the two are working on a five-year report that will publish Heffington’s findings. As far as Boccadori and Heffington know, being able to document three matrilineal generations of wolverines using just camera traps has never been done before.

One major challenge in documenting the relatively scarce wolverines is that individuals’ home ranges span several hundred square miles. Another is that these largest members of the weasel family live in some of Montana’s most rugged and remote mountains.

“Having a volunteer like Don, who is so dedicated and has become so knowledgeable, is critical to our understanding of wolverines in this part of the state,” Boccadori says. She notes that FWP has made wolverine monitoring a major priority as global warming and human development threaten the furbearers’ habitats.

Wolverines aren’t the only animals benefiting from Heffington’s dedication afield. In 2018, one of his remote cameras took a picture of a Canada lynx, a federally threatened species. At the time, lynx weren’t known to live in the Beaverhead-Deerlodge

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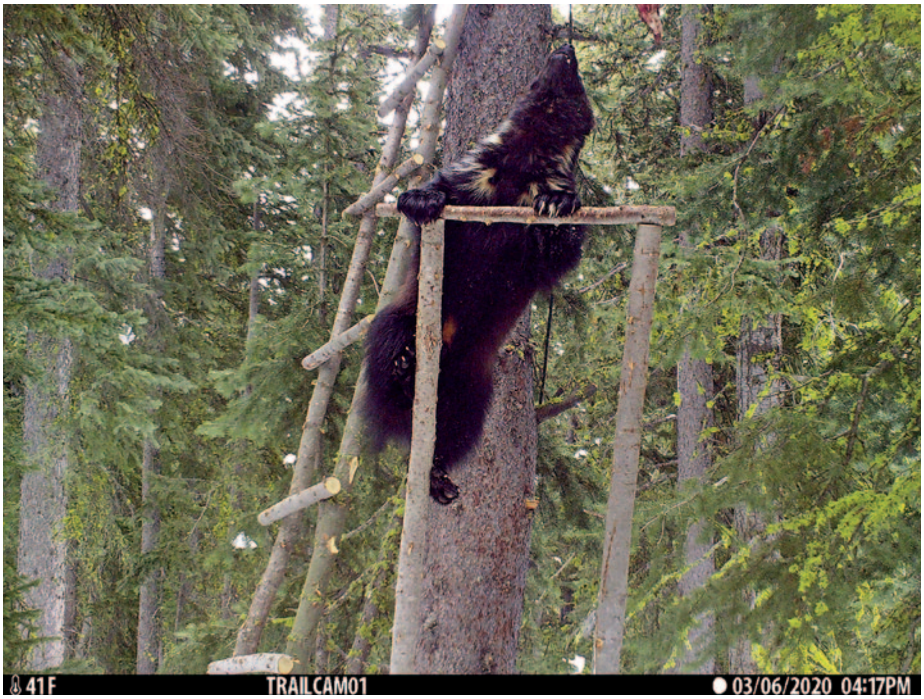
Sierra Cistone is a photojournalist and writer based in Missoula.



UNDERCOAT “FINGERPRINT” A photo from one of Heffington’s trail cameras shows how a wolverine exposes its underside, showing the unique white markings that allow him to identify individual animals, as it climbs his log structures to retrieve the bait.

National Forest, and the confirmed sighting required the forest's staff to tighten restrictions on logging and other activities that could imperil the big cat's habitat. By knowing where at-risk species live, land managers can find ways for some development to continue while protecting critical habitat.

Neil Anderson, FWP regional wildlife manager in Kalispell, says the agency depends on many volunteers throughout the state who help monitor wildlife, assist at hunter check stations, and help with public education. "The state is just too big for us to manage wildlife on our own," he says. "We need the public's help, and then when someone like Don comes along, we get far more than we ever hoped for."

As for Heffington, right now in late fall 2023 he's setting up his cameras—though without bait so that bears don't bother them. After bears hibernate for the winter, he'll return with venison he hopes will entice any wandering wolverines to come investigate.

Heffington estimates he has put in thousands of hours monitoring wolverines, and he has no plans to stop any time soon. "It's something I'd like to see more people doing," he says of his wildlife conservation volunteer work. "It's enjoyable, it keeps you active, and it's something worthwhile." 🐻

HARD TO FIND Wolverines, like these in the Lewis and Clark–Helena National Forest, are rare, solitary forest carnivores difficult for biologists to count. Heffington's ingenious method of identifying individuals is helping FWP biologists better understand how the Pintler Range population is faring.

PHOTOS: KALON BAUGHN

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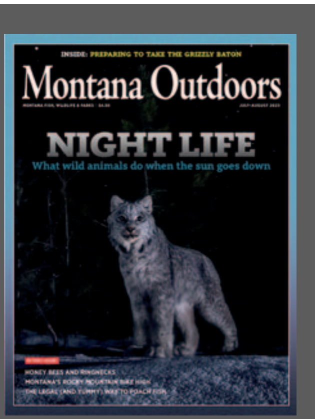
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Wolverine Watcher An 83-year-old volunteer is changing what we know about the state's rarest large carnivores. By Sierra Cistone

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Thanks for giving

By Tom Dickson

When most hunters talk to each other about hunting, they discuss the firearms and ammo, the physical challenge, or the antler size of the big buck or bull they dream of shooting.

I focus mainly on the meat.

Sure, I'm interested in all that other stuff. But I'm primarily out there for late-season mallards on the grill, wine-braised deer shanks, and sautéed pheasant breasts topped with a gin-infused cream sauce.

My focus on food may come from taking up hunting later in life. I'd done some small game and duck hunting in my teens and 20s, but I didn't try to shoot a deer until I was 39. I wanted venison, which I'd read was delicious but had never had the chance to try. One bite of that acorn-fed Wisconsin whitetail doe and I was a changed man.

Since then, I've been lucky to fill my small standup freezer each fall with a deer or two, several ducks and pheasants, a few sharptails, and the occasional Canada goose. It's a great feeling, looking at those white paper-wrapped packets of frozen meat and knowing I've provided for my family for another year.

I'm thankful for all that meat—and for all the fun I have hunting it.

Several years ago, an FWP colleague tallied how much venison is harvested by hunters in Montana each year. He multiplied the average weight of meat produced per animal by the average hunter harvest and came up with a total of 9.3 million pounds of venison (elk, deer, and pronghorn).

Elk produced the most wild meat (4.6 million pounds), followed by white-tailed deer (2.3 million pounds), mule deer (2.1 million pounds), and pronghorn (350,000 pounds).

That's a mountain of meat.

Compared to beef, which ranges from an average of $6 per pound for a standard roast to $20 per pound for organic, grass-fed beef, those 9.3 million pounds of wild meat are worth $56 million to $186 million.

For a hunter who harvests a buck that yields, say, 60 pounds of boneless venison, that's $360 to $1,800 worth of meat. When priced the same as farm-raised venison, which runs about $40 per pound, the meat of that single buck is worth around $2,400.

For an elk, multiply those figures by three or four.

The significance of all this meat goes beyond hunters not having to buy the equivalent amount of beef or pork, savings important to a lot of families. Game meat is organic, low in saturated fat, and the very definition of free range. It checks all the boxes for ideal meat in terms of health, the environment, and animal welfare.

Here at *Montana Outdoors*, we've done all we can to help others make the most of their harvest, publishing and listing online dozens of recipes that allow anyone to prepare delectable dishes (fwp.mt.gov/montana-outdoors/recipes). One reason is to reduce the emphasis on trophies and limits, which the nonhunting majority of Americans finds distasteful.

I've often heard that after a successful bison hunt, Native American hunters thank the buffalo for giving itself up to them. What a wonderful gesture of respect and gratitude.

In that same spirit, I want to express my thanks this holiday season to all the game animals that gave themselves up to me during my days afield. I promise to appreciate and savor every bite. 🐻

Tom Dickson is the Montana Outdoors *editor.*

ILLUSTRATION BY STAN FELLOWS

CINDY GOEDDEL

Coyote

Canis latrans

By Jim Pashby

Years ago when driving through Yellowstone National Park for the first time, I passed a coyote sitting near the road. I pulled over and parked. It sat there, 50 yards away, scratching its ear. I'd never seen anything like it in my life.

I'd seen plenty of coyotes before, but always at a distance running full tilt across a field. That's because most everywhere except national parks, coyotes get shot at—by hunters, recreational shooters, and stockgrowers. In most of Montana, a vehicle that slows down means only one thing to a wary coyote: Hightail it out of there as fast as possible.

But in Yellowstone, I had the chance to really look at a coyote up close and admire its beauty for the first time.

SCIENTIFIC NAME

Canis is Latin for "dog," and *latrans* is Latin for "barking dog." The common name may come from the Aztec word *coyotl*, also meaning "barking dog."

IDENTIFICATION

Coyotes are members of the Canid, or dog, family, which in Montana also includes gray wolves, swift foxes, red foxes, and domestic dogs. Coyotes have a sharp snout, long pointed ears, and a long bushy tail tipped in black. The fur ranges from grayish buff to brownish gray.

Coyotes are commonly mistaken for wolves, but they are much smaller, averaging just 22 to 28 pounds and 1.5 feet tall at the shoulder, compared to the wolf's 78- to 103-pound average and shoulder height of 2.5 feet. At a distance, with nothing to compare them to, a coyote looks a lot like a wolf, so the misidentification is understandable.

One way to ID a coyote is to watch the animal on the move. "When running, the coyote carries its tail low, nearly between its legs; domestic dogs and wolves allow the tail to ride up," Dr. Kerry Foresman writes in *Mammals of Montana*. Also, coyotes live statewide while wolves occur only in the state's western half.

HABITAT

Coyotes prefer open plains but can survive in forests and even suburbs and rural subdivisions.

DIET

Coyotes will eat almost anything, including berries, human garbage, birds and their eggs, and reptiles. Meat is their preferred food, and they hunt small mammals ranging from cottontails and jackrabbits to Columbian ground squirrels and marmots. The mid-size carnivores are notorious for preying on lambs, beef calves, deer fawns, and baby elk, though it's sometimes not clear if they have killed the young animal or are scavenging on one that died of starvation, disease, or other causes.

SOCIAL STRUCTURE AND REPRODUCTION

Coyotes may live in small packs of several individuals, but, unlike wolves, they usually travel alone. A mating pair sticks together while the female nurses the young, which are born in a den located in a cut bank or brushy ravine or under a large deadfall. The four to seven young are born blind and helpless in late March through April. By three weeks of age, the pups begin leaving the den to explore their surroundings.

HOWLING

Coyotes "yip-howl" at dusk, making a sound that resembles someone screaming in a high-pitched voice. The yip-howl serves as a territorial display warning other coyotes to stay away. And that's just one sound. A single coyote can produce such a wide variety of howls that it can sound like an entire pack.

CONSERVATION STATUS

Coyote are classified in Montana as a "varmint" and can be killed by anyone, without a license, at any time of year. Though coyotes numbers aren't monitored, populations seem to be healthy.

Wolves don't tolerate coyotes, so as wolves were killed off during the early 1900s, coyotes quickly filled the vacuum. In recent years, the recovery of wolves in western Montana may have reduced coyote numbers, though no one is sure. That possible decline may be offset by less mortality from hunting and trapping as coyote fur prices have dropped by more than half in recent years.

Jim Pashby is a writer in Helena.

THE **OUTSIDE** IS IN US ALL.

Whether it's by boating, hiking, fishing, mountain biking, wildlife watching, or **glassing for elk in the Big Belt Mountains,** Montana is a state where everyone can find their own special way to connect with the natural world. Around here, **the outside is in us all.** PHOTO BY CADE DURAN

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